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U.S. Army Surgeon General's Office

History of

PREVENTIVE MEDICINE IN THE NORTHWEST SERVICE COMMAND

NORTHWEST DIVISION, UNITED STATES ENGINEER DEPARTMENT

AND NORTHWEST DISTRICT, SIXTH SERVICE COMMAND

This monograph is being made available in manuscript form pending the completion of the official History of the Medical Department in World War II, and must be considered as a draft subject to final editing and revision. Persons finding errors in facts or important omissions should communicate with the Historical Division, Army Medical Library, Washington 25, D.C.

It is emphasized that all statistical data in this monograph are tentative and subject to revision when tabulation of individual sick and wounded report cards has been completed.

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ARMY SERVICE FORCES
SIXTH SERVICE COMMAND
NORTHWEST DISTRICT
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6 May 1946

SUBJECT: History of Preventive Medicine in World War II.

TO : The Surgeon General, U. S. Army, Washington 25, D.C.
Attention: Historical Division.

THRU : The Commanding General, Sixth Service Command,
Civic Opera Building, Chicago 6, Illinois.

THRU : The Commanding Officer, Northwest District, Sixth Service
Command, APO 722, Minneapolis, Minnesota.

1. Transmitted herewith is the "History of Preventive Medicine in World War II" for the Northwest Service Command prepared pursuant to instructions contained in Surgeon General's letter, subject as above, 6 July 1945, to the Service Command Surgeon, a copy of which follows.

2. Previous instructions indicated that one copy of this history is to be filed in the office of the theater surgeon and one copy is to be forwarded to the Surgeon General's Office, attention of the Historical Division.

3. Individual historians will obviously differ among themselves as to relevant material to be included in a history such as this. The undersigned was restricted in this respect since the Northwest Service Command was inactivated in June 1945 and medical records were shipped out prior to the assignment of the undersigned as historian to relieve Captain Robert L. Rowland, MAC, in December 1945. It is however, felt that any additional information that may be desired is on file in the Surgeon General's Office.

/s/ Frank G. Manning
FRANK G. MANNING
CAPTAIN, Sn. C.
MEDICAL HISTORICAL OFFICER

424484

DOCUMENTATION

1. Annual Report of the Service Command Surgeon.

2. Essential Technical Medical Data Reports.

3. Information furnished by Medical Officers who were on the site.

4. Correspondence in the Service Command Surgeon's file.

5. Inspection records from the Service Command Surgeon's file.

6. Information assembled from Northwest Service Command Headquarters files.

7. "Canol" by Richard Finnie, a book published for the Bechtel-Price-Callahan Companies (Reviewed by War Department Bureau of Public Relations)

8. Information furnished from the personal experience of the author who was assigned as one of the Sanitary Officers.

9. The Canada Year Book, 1943-44, published by the Dominion Bureau of Statistics, Department of Trade and Commerce.

NOTE: Each paragraph contained herein has a numerical index indicating the source of information with reference to the documentation shown above.

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and Northwest District, Sixth Service Command

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CHAPTER 1

Early Military History of Major Projects

The early history of the Northwest Service Command is closely affiliated and inter-linked with the activities of the Northwest Division, U. S. Engineer Department and the Public Roads Administration, as well as many Contractors engaged by these two agencies. The major objectives of the Army Service Forces in this area were the construction of the Alaska Military Highway and the Canol Project. A brief history of these projects follows.

ALASKA HIGHWAY

Prior to the formation of any definite plans for the construction of the Alaska Military Highway a joint international committee had made a thorough study of the possibility of constructing the road to Alaska and several routes had been chosen. However, nothing was actually done about beginning the construction until the spring of 1942, at which time it was decided that construction of this highway was a military necessity. The supplying of troops in Alaska and part in the Aleutian Islands was a primary consideration. Loss of shipping and the need of ships to carry supplies to more remote parts of the world made an overland route in this area seem the most possible and practicable solution. Furthermore, a chain of airfields had been constructed spanning northwestern Canada and forming a line between the United States and Alaska. To properly complete and service these airfields the highway was considered nebessary.[6]

A letter of 14 February 1942 from the Adjutant General to the Chief of Engineers stated in part "It is desired that you undertake the construction with Engineer troops of a pioneer type road from Fort St. John to Big Delta, Alaska, via Fort Nelson, Canada; Watson Lake, Canada; Whitehorse, Canada; and Boundary, Alaska. It is desired that you arrange with the Public Roads Administration to follow the Engineer troops to correct alignment and grade, construct permanent bridges and culverts, and provide for the completion of the project."[6]

Diplomatic approval of this project was initiated on 16 February 1942, by the Canada-United States Permanent Joint

Board on Defense. Construction of the highway was recommended by the Permanent Joint Board on 26 February 1942 and was approved by Canada on 6 March of that year. Each Government assumed certain obligations to insure expeditious completion of this project. The Government of the United States agreed to make the necessary surveys and to construct a pioneer road by use of Army Engineer troops; to arrange for the completion of the highway under contracts made by (PRA) Public Road Administration with Canadian and American contractors; to maintain the highway for the duration of the present war and six months thereafter unless the Canadian Government should prefer to assume maintenance of the section in Canada at an earlier date, and at the conclusion of the war that part of the highway which lies in Canada would become an integral part of the Canadian highway system but no discrimination would be exercised against United States civilian traffic. The Canadian Government agreed to acquire the necessary right of way in Canada; to permit the procurement of timber, rock, and gravel from crown lands for use on the highway; to waive import duties and other transit charges on shipments from the United States to the project and over the project to Alaska; to facilitate admission of United States residents employed on the project in Canada with the understanding that repatriation of such employees would be the responsibility of the contractors or the United States Government.[6]

The Chief of Engineers placed a brigadier general in charge of this project with the intention of constructing the road in two working seasons. During the first season the equipment was to be brought in and as much work accomplished as possible. Then the troops would leave the area during the winter of 1942-43 and return in the spring to complete the project. Consequently it was not even deemed necessary for the troop units to bring pyramidal tents and tent stoves or cots since it was believed that the many movements of the troops would necessitate their living in pup tents during the entire construction season.[6]

Preliminary reconnaissance and map study indicated that the route chosen traversed some of the most rugged terrain on the North American continent. Weather conditions were known to vary from a summer temperature of 90° to extremely cold winters with temperatures as low as 75° below zero. It was for this reason that the original plan was made calling for the construction of the highway in two working seasons.[6]

The original mission of the Task Forces was the construction of a nine-foot wide pioneer road capable of carrying sufficient supplies to maintain the troops during construction. Contractors under the PRA

were to relocate and improve the road by widening and surfacing to form an all weather, all year highway. Road specifications issued by the Chief of Engineers were changed several times during the working season when it became apparent that the highway could be constructed during one season.[6]

The project was divided into two parts with the principal headquarters and Northern Sector Headquarters in Whitehorse, Yukon Territory, and the Southern Sector Headquarters in Fort St. John, British Columbia. It soon became apparent to the General that due to the lack of transportation and communication he could not effectively command both Sectors. To correct this situation the Chief of Engineers assigned a Brigadier General to command the Southern Sector. The boundary between the two Sectors was established at Watson Lake.[6]

The Southern Sector Headquarters was the first to be established. The 35th Combat Engineer Regiment arrived in Dawson Creek early in March and they were immediately moved to Fort St. John. As soon as sufficient rations and other supplies for a company were on hand at Fort Nelson or enroute there, a company of troops was moved to that point. In general the Army trucks in continuous shuttles carried all troops and supplies except petroleum products which were hauled by a civilian contractor operating a maxium of 150 trucks. Troops moving from Fort St. John to Fort Nelson made the 250 mile trip non-stop except for food, with a minimum running time of twenty hours. The first loads started north from Dawson Creek on 5 March and the movement continued at such a pace that the complete regiment with attached troops and sufficient supplies and equipment for 150 days construction had cleared Fort St. John by 30 March. By this time the condition of the winter trail prevented further shipments to the north. Until the road was put through, all further shipments had to go either by air or by the long water route from Waterways, Alberta, via the MacKenzie and Liard water systems, finally arriving in Fort Nelson.[6]

The 35th Engineers started their road location and construction west of Fort Nelson during the month of April. The 74th Light Ponton Company and Company A of the 648th Engineer Topographical Battalion rendered considerable assistance in ground reconnaissance.[6]

The 341st Engineer Regiment arrived in Dawson Creek on 1 May. They moved immediately to Charlie Lake. Here on 6 May they started construction of the pioneer road north of St. John.[6]

A photographic ship from the 2nd Mapping Squadron reported to the Southern Sector on 11 May. A photographic reconnaissance was made of the route from Fort St. John to Fort Nelson as well as the route from Fort Nelson to Watson Lake. Aerial photographs proved of immense value in the detailed location of the road.[6]

The 95th Engineer Regiment, colored, arrived in Dawson Creek 1 June and took over the road maintenance and finished grading work behind the 341st Engineers. The supporting troops in the Southern Sector in addition to the 74th Light Ponton Company and Company A, 648th Topographical Battalion included the 140th Quartermaster Truck Company, several Quartermaster Detachments, several Signal Detachments and a Company of the 58th Medical Battalion. The Supply system was considerably improved when the bottleneck at the Peace River crossing was eliminated by the arrival of the sixty ton ferry M. V. Alcan. This ferry and barge was received at Taylor Flats on 1 June and immediately put into operation by a detachment of the 74th Light Ponton Company. Later as the Supply line became extended the 133rd Quartermaster Truck Company arrived to assist in the movement of supplies.[6]

The Northern Sector was also established in the middle of March 1942. Three Engineer General Service Regiments and one Combat Engineer Regiment with supporting troops were assigned to the Sector. The principal problem at the beginning was to find as many points as possible along the proposed route to which the troop units would be moved to attack the job. Then consideration had to be given to supplying these units in their initial location and after they had moved some distance from their best base of supply. Because of the water and rail service into Whitehorse, it was by far the base of operations. Therefore two regiments were assigned to work in opposite directions from the Whitehorse base. A third regiment was to move to this area and thence eastward toward Watson Lake as far as water transportation was available. Consideration was given to the route over the Stikine River, Dease Lakes and Dease River into Lower Post but because of low water during the summer this route was not practicable. The fourth regiment was to move through Valdez and over the Richardson Highway and Nabesna cutoff to Slana where their operations were to commence.[6]

The 18th Combat Engineer Regiment was the first to arrive in Whitehorse on approximately 3 April 1942. They set up camp and conducted a preliminary reconnaissance while awaiting the arrival of their construction equipment. This regiment followed the old Dawson trail as far as Takhini and thence westward to Kluane Lake.[6]

The 93rd Engineer General Service Regiment, colored, and the 340th Engineer General Service Regiment arrived in Skagway during the month of April 1942. However since none of their construction equipment had arrived it was considered advisable for them to remain in Skagway because of the shorter lines of supply.[6]

About 1 May the 93rd Engineers were moved to Carcross where they established a base camp. Their first project was to construct a road to Tagish on Lake Tagish. This was not a part of the finished highway but it was to serve as a supply route for both the 93rd and the 340th Engineers.[6]

With the opening of river transportation on the Lewes River in the middle of May, the 340th was brought north. One battalion came to Carcross from where they made a forced march, with very little equipment and supplies, over a pioneer trail constructed by the 93rd, to reach the Teslin River. Here the troops were picked up by river boats from Whitehorse and ferried down Teslin Lake to Morley Bay where they established their base camp. The other battalion proceeded to Whitehorse by rail after which they made the long and circuitous water journey to Teslin and Morley Bay. All equipment and supplies continued to go to the 340th by water until the 93rd completed the road to Teslin.[6]

The 97th Engineer General Service Regiment, colored, arrived in Valdez, Alaska, about 1 May, but the road conditions through Big Thompson pass on the Richardson Highway would not permit their movement to Slana until the middle of May. The first mission of the Regiment was the improvement of the road to Slana, so that construction toward the Tanna River was not begun until June.[6]

In the Northern Sector the supporting troops included Company D, 29th Engineer Battalion whose mission was road location and final survey of the completed road, the 73rd Light Ponton Company whose mission was to assist the Regiments in all water crossings and ferrying operations until such time as permanent bridges could be constructed, and a company of the 58th Medical Battalion. One Quartermaster Detachment was stationed at Skagway to operate the port and a second Detachment was sent to Whitehorse to establish a railhead. Later in the season organizational transportation proved inadequate. To relieve this situation the 134th Quartermaster Truck Company was stationed at the Carcross sub-railhead to supply the 93rd and 340th Engineer Regiments and the 141st Quartermaster Truck Company supplied the 18th Engineer Regiment from the Whitehorse Railhead. The 428th Engineer Dump Truck

Company was broken into platoons and attached to the several Regiments to provide gravel hauling equipment.[6]

Through an exchange of letters between Brigadier General C. L. Sturdevant, Assistant Chief of Engineers, and Mr. Thomas H. MacDonald, Commissioner of the Public Roads Administration, the functions to be performed by PRA in the construction of the Canadian-Alaskan Military Highway were established. Division offices were set up in Fort St. John and Whitehorse. To expedite mobilization of civilian contractors the PRA entered into the Cost Plus a Fixed-Fee contracts with five management contractors. These management companies organized and transported men, materials and equipment as required by their respective assignments.[6]

The E. W. Elliott Company of Seattle, Washington, was retained to handle transportation and camp construction. The R. Melville Smith Company Limited was assigned approximately 250 miles of highway construction between Dawson Creek and Fort St. John and between Fort Nelson and Watson Lake. The Okes Construction Company of St. Paul, Minnesota, was assigned approximately 260 miles of highway construction between Fort St. John and Fort Nelson. Dowell Construction Company, Seattle, Washington, was assigned approximately 630 miles of highway construction between Watson Lake and the Alaska border. The Lytle and Green Construction Company, Sioux City, Iowa, was assigned approximately 310 miles of highway construction in Alaska. During the construction season of 1942, the contractors under PRA did not accomplish much actual construction although the road locating parties worked in close cooperation with the Army Engineer forces.[6]

To coordinate all activities the Northwest Service Command was established by War Department General Order No. 44 of 4 September 1942. Brigadier General Hoge was reassigned to the Armored Forces and Brigadier General O'Connor was placed in command of the new organization.[6]

By the end of August, the 341st Engineers had pushed the road through to the Muskwa River crossing where they tied in with the construction work of the 35th Engineers. The 95th Engineers in conjunction with a few civilian contractors had finished grading the road to Mile 180. The 35th Engineers after crossing the Liard River began the construction of a two lane road instead of the narrow one lane previously constructed. The 341st Engineers and later the 95th moved on into the 35th Engineer's area to widen the road, improve drainage, and applied a gravel surface.[6]

On 24th September 1942, the 35th Engineers working west from Fort Nelson made contact with the 340th Engineers working east from Teslin. This action occurred at a creek 305 miles west of Fort Nelson. This creek was quite appropriately christened Contact Creek. Thus the road was opened from Dawson Creek to Whitehorse, Y. T., by 1 October, a pilot run of three trucks daily was inaugurated. Work was continued to convert the pioneer road into an improved road.[6]

Aerial photographs taken by the Second Mapping Squadron also proved invaluable in the selection of the route through the Northern Sector. Considerable difficulty was encountered in locating the road in certain sections, particularly between the Donjek river and the Alaskan Border.[6]

During the month of November, the 97th Engineers working south from the Tanana Crossing met the 18th Engineers working north from Whitehorse, thus completing the Alcan Highway which was formally opened on 20 November 1942. The first convoy of trucks from Dawson Creek to Fairbanks left Whitehorse on 19 November and arrived in Fairbanks on 22 November with a load of freight for Ladd Field. Plans were being formulated for the daily dispatching of 100 trucks from the Dawson Creek Railhead. During the month of November, approximately 1000 trucks were dispatched from Dawson Creek. The trucks were operated by the Quartermaster truck companies although considerable assistance was rendered by the Engineer Regiments. During the month of January 1943, the 477th Quartermaster Truck Regiment arrived in Dawson Creek and took over all highway trucking operations.[6]

Several of the Engineer Regiments were returned to aid in the road maintenance and to replace any bridges which might be taken out by ice action or high water during the 1943 spring breakup. All the Engineer Regiments had departed from the Northern Sector by 1 May 1943, and from the Southern Sector by 1 September 1943.[6]

The PRA in 1943, using somewhat reduced specifications, carried on the construction of the all weather highway. Briefly summarized, the maximum road width was 26 feet with a 20 to 22 foot running strip surfaced with gravel obtained locally; maximum grade of 10 per cent; alignment to follow the pioneer road with a minimum of relocation to improve conditions, and a total of 34 steel bridges to be constructed at critical points.[6]

Under the PRA management contractors were a total of 76 subcontractors with approximately 14,000 employees during the peak of construction in 1943. The greatest amount of equipment ever assembled for a road construction project, numbering approximately 11,100 pieces, was used on the Alaska Highway.[6]

The Northwest Division was established 14 November 1942, with the responsibility of all construction, maintenance and repair of the Alcan Project under the direction of the Commanding General, Northwest Service Command. As a result of the added impetus given by directives from the Northwest Division Engineer, the all weather road was completed on 13 October 1943. All management contracts were closed out and the personnel and equipment evacuated as rapidly as possible.[6]

The final phase of construction on the Alaska Highway consisted of completing bridges for which materials were not available during the 1943 construction season. This bridge work was resumed early in 1944 and completed on 10 October of that year.[6]

The highway maintenance program was first set up in the Dawson Creek District early in September 1943. This District used the purchase and hire method while the maintenance work in the Fairbanks and Whitehorse Districts was by contract. The initial plan in the Dawson Creek District was established on the basis of one man per mile of road. This goal was not immediately attained but a comparison of costs revealed the purchase and hire method to be the more economical. During early 1944, the entire maintenance program was put on a purchase and hire basis and it functioned under the Alaska Highway Maintenance Branch. In 1945 maintenance camps were set up on an apartment basis with 5 to 6 Canadian families to a camp. It is estimated that approximately 13 miles of highway was maintained per man at that time the Alaska Highway was turned over to the Canadian Government on 3 April 1946.[6]

NOTE: The foregoing early history of the Alaska Highway was for the most part excerpted from a paper presented to the Northwest Service Command officers at Whitehorse by Captain Philip Neal, CE., in April 1945. Captain Neal's data were compiled from material in Northwest Service Command headquarters files.

CANOL PROJECT

Canol is a contraction of Canadian Oil. The project itself is a war orphan. Without the threat in the north the Canol project would have been economically unfeasible. In the spring of 1942 the Japanese became a real threat to us in the Aleutians. By that time they had overrun most everything in the South Pacific. Could they then scramble over our Aleutian stepping stones and gain a foothold on the Alaskan Mainland they would be well based to cripple our North Atlantic shipping and conveniently attack the West coasts of Canada and the United States. Bases in Alaska were inadequate at that time and could only be supplied by sea or air. There was no land route through Canada. So we started the Alaska Highway in March 1942. This tied in with airports and flight strips for our combat and transport planes. Canada had airports established from Edmonton to Whitehorse. Initial construction on our own airports in Alaska was begun by the U. S. Civil Aeronautics Authority but all of these had to be enlarged and emergency flight strips constructed. Fuel for construction, fuel for planes, and fuel for truck traffic had to be provided and there was a very high premium on tankers. There was a poorly developed supply at Norman Wells but geologists estimated that the establishment of additional wells would supply the demand.[7]

Out of this combination of circumstances the War Department evolved the plan of the Canol Project. With the consent of the Canadian Government, the Corps of Engineers aided by civilian contractors would develop the Norman Wells field. Simultaneously the plan called for the establishment of a pipe line to a point on the Alaska Highway where a refinery was to be built to make the necessary conversion of crude oil into gasoline. This refinery was to be established at Whitehorse which was at the head of the Yukon River system and had rail connection to tide water. This decision to construct the Canol Project was originated by the War Department at the end of April 1942 and was assigned to the Corps of Engineers. The firms of W. A. Bechtel Co., H. C. Price Co., and W. E. Callahan Construction Company were invited to consider the project. A contract for the construction of a crude oil pipeline and the design and construction of the refinery and petroleum facilities was entered into on 4 May and executed on 20 May 1942 between the War Department and Bechtel-Price-Callahan, a pro-tem partnership of the above three firms and six of their associates; Bechtel Company, J. H. Pomeroy & Company, Inc. BMP Company, Gunther and Shirley Company, R. A. Conyes, and Paul Grafe.[7]

At the same time the Standard Oil Company of California was designated by the War Department as consultant on the design and construction of the project, and the firm of J. Gordon Turnbull and Sverdrup & Parcel was selected by the Army as architect-engineer for the project. The proprietors of the Normal Wells field, the Imperial Oil Company, were responsible for the production of oil, while the Standard Oil Company of Alaska--an affiliate of Standard Oil of California was to operate the pipeline and refinery when they were built.[7]

On May 27 and 28 the advance guard of the Canol Project reached Edmonton, which was to be headquarters. There were the Officer in charge for the Corps of Engineers, and officials of the Constructor, the Architect-Engineer, and the United States Engineer Department.[7]

About 2500 Engineer troops were then moved through Edmonton. They were sent over the Northern Alberta Railroad 285 miles to Waterways, the end of steel, and the starting point of an 1100 mile water route to Norman Wells. The route lay 285 miles down the Athabaska River, through Athabaska Lake, down the Slave River to Fort Fitzgerald, where navigation was interrupted by sixteen miles of rapids. All freight had to be portaged to the foot of the rapids at Fort Smith, administrative headquarters for the Mackenzie District, then reloaded and sent on down the Slave River 190 miles to the delta, 150 miles across Great Slave Lake and on down the Mackenzie River itself 500 miles to Norman Wells.[7]

In the initial planning it had been the Army's intention to do all the hauling, to deliver all the freight--an estimated 50,000 tons to the job site. But time was the essence, and it became apparent that all available facilities and agencies would be needed. So along with the Army worked the Constructor and the Hudson's Bay Company and the Northern Transportation Company. Both of the latter companies already had boats and barges operating on the Mackenzie River system, and the Army and the Constructor brought in Diesel tugs from the Missouri and they assembled prefabricated wooden barges (later, steel ones also) at Waterways.[7]

For construction jobs in remote lands, native labor is usually available; for this one there was practically none, because the Indians were few and scattered, and while some acted as guides, dog drivers and river pilots, their usefulness as a group was negligible. Because of Canadian wartime labor restrictions, based on a shortage of manpower, comparatively few Canadians could be used. So the bulk of the workers had to come from the United States.[7]

Military and civilian camps had to be erected at Waterways, Fort Fitzgerald, Fort Smith, the Slave Delta, Fort Resolution, Hay River, Wrigley Harbor, Fort Providence, Fort Simpson, Fort Wrigley, and Norman Wells. Opposite Norman Wells, four miles across the river, virgin ground was broken for Canol Camp, which was to be the starting point for the pipeline road over the mountains to Whitehorse.[7]

The Army and the constructor were unable to get the necessary freight to Norman Wells and Canol Camp before freeze-up. The season was just too short, with only five months of open water. Assistance was given by Canadian Pacific Airlines, whose planes carried personnel, mail and express to Norman Wells, Canol Camp and intermediate points. Bechtel-Price-Callahan augmented this commercial service with bush planes of their own.[7]

But the ski-and-float-equipped planes in northern use could carry only small pay loads and were immobilized during the long periods of freeze-up and break-up. Large transport planes were needed, and transports operated on wheels. Unfortunately there wasn't a landing field in the whole Mackenzie District. So the constructor was asked to build a chain of airfields with the aid of the Engineer troops. That was in August. Before freeze-up ten fields had been carved out between Edmonton and Norman Wells, and an Army transport made the first landing at the Wells on the 30th of September.[7]

The building and maintaining of airfields and the operating of airplanes were not in the original plan, nor were the building and operating of boats and barges and the building and operating of freight transfer camps. They came under the heading, "Supplemental Agreement." Many unpredictable conditions required other supplemental agreements before the Canol Project was finished.[7]

The prime contract had seemed relatively simple though great in scope--to build a refinery and a pipeline and necessary access roads. But the location complicated it, for the building had to be done in partly unexplored wilderness a thousand miles from the nearest sizeable city. Then, to ensure economic distribution of the petroleum products, additional pipelines and facilities had to be considered and weighed against the Japanese situation in the North Pacific.[7]

All of these factors caused Canol to grow. The Army and the Constructor were obliged to carry out supplement after supplement to the prime contract.[7]

The first was the building of the Skagway-Whitehorse pipeline, and moving freight through Prince Rupert.[7]

Studies indicated that the pipeline should be built from both ends, and that until it and the refinery were in operation which would take a year or longer, a supplementary line could profitably be installed between Skagway and Whitehorse to feed imported gasoline to the Alaska Highway and its airfields, thus relieving some of the strain on the railroad. The Inside Passage to Skagway became available for Canol as well as Alaska Highway shipping after the Japanese in the Aleutians had been brought under control; and once the Alaska Highway was passable as far as Whitehorse, it, too, could be used for Canol freighting.[7]

With an assured gasoline supply at Whitehorse in the immediate future, a distribution system was started along the Highway to the various airfields. Gasoline could then be piped from Whitehorse nearly 900 miles between Watson Lake and Fairbanks. That, too, called for supplemental agreements.[7]

There were still others. A thousand mile winter road down the Mackenzie Valley had to be built and used, additional boats and barges had to be provided for the next season's freighting, offices and barracks and warehouses and staging facilities had to be built in Edmonton as well as in the North. Although work on the prime contract were on unremittingly, its difficulties were so great that its fulfilment was delayed until all of the diverse supplements--including nearly a thousand miles of pipelines were completed and in operation.[7]

On February 16, 1944, the Golden Weld in the main pipeline was made, and exactly two months later crude oil from Norman Wells flowed into Whitehorse, where the already completed refinery began digesting it.[7]

Then the refined products flowed out to fuel the vehicles using the Alaska Highway; they were pumped to airports and flight strips spotted from Watson Lake to Fairbanks; and they were sent down to tide water at Skagway.[7]

During the war Canol played the role the War Department planned for it, as much as the vagaries of war permitted, in strengthening Alaska's position and speeding planes on their long journey across the North Pacific.[7]

In peacetime the 1600 miles of pipelines, the roads, the refinery, and the tank farms, all of which are the Canol Project, will be remembered chiefly as a means of developing new petroleum resources, and as one of the instruments which pried open a vast and rich hinterland for the joint benefit of Canada and the United States.[7]

Thousands of men and women, both civilian and military, worked on the Canol Project. Many of them went into the far north, lived there for periods of up to two years, and came back to tell their families and friends about it. Some of them may have emphasized the hardships, real or imaginary, that they had to bear; but their collective testimony, along with that of the thousands of people who worked on the Alaska Highway, will have forever shattered the myth of an eternally frigid, barren and inhospitable North.[7]

Records showed, too, that the North is not necessarily dangerous to life and limb. No persons on the Canol Project were mauled by wild animals, lost in blizzards, or badly frost bitten, although many were pestered by mosquitoes and black flies. There was little illness, for no climate is more healthful than that of the sub-Arctic. There were no injuries or fatalities due to any hazards peculiar to the country, and the Army's and the constructor's safety program was so effective that industrial casualties were few.[7]

CHAPTER 2

Early Medical History in This Command

At the beginning of operations on the Alaska Military Highway the project was, as previously described, divided into two parts; The Whitehorse and Fort St. John Sectors. A brief early history of these sectors and the station hospitals that were developed therein and other station hospitals that were established in this Command follows:

1. WHITEHORSE SECTOR:

The Office of the Force Surgeon, Alcan Highway was activated at Fort Lewis, Washington, April 13, 1942, consisting of one (1) Lt. Colonel, one (1) 2nd Lt., M.A.C., a Staff Sergeant, a duty Sergeant and a Private First Class. It joined the Headquarters Detachment, Alcan Highway, Whitehorse, Y. T., April 25, 1942, and functioned as Force Surgeon, Alcan Highway, until June 12, 1942, when the command of the Alcan Highway was divided into two sectors. At that time, the Force Surgeon took over the duties of The Surgeon, Whitehorse Sector. Prior to June 12, 1942, this headquarters had jurisdiction over the 18th Engineer Regiment (C), located in the Lake Kluane, Y. T., region; 93rd Engineer Regiment (GS) located in and around Carcross, Y. T.; the 97th Engineer Regiment (GS) bivouaced at Valdez, Alaska, preparatory to movement to Slana, Alaska; the 340th Engineer Regiment (GS) at Skagway, Alaska, awaiting shipment to Whitehorse, Y. T.; Co. "D" 29th Engineer Bn. (Top) located at Whitehorse; Co. "D" 58th Medical Bn. (less one platoon) located at Whitehorse, with the other platoon located at Fort St. John, B.C., the 35th Engineer Regiment (GS), located at Fort Nelson, B.C.; and the 341st Engineer Regiment (GS) located at Fort St. John, B.C. As can be seen by this description, evacuation, which was normally from the regiments to the two medical installations at Whitehorse and Fort St. John, involved distances of sometimes more than five hundred miles, over country which, in many cases had roads of the poorest type. Air evacuation was imperative and was used with success. In order to shorten the evacuation distance, three (3) fifteen (15) bed dispensaries, located at Slana, Alaska, Morley Bay, Y. T., and Fort Nelson, B.C. were planned and eventually put into operation in June and July.

(C) Combat
(GS) General Service
(Top) Topographical
(LP) Light Pontoon
(Sep) Separate

After the division of the highway command into the two sectors, the Northern Sector Headquarters had command over the 18th Engineer Regiment (C), 93rd Engineer Regiment (GS), 97th Engineer Regiment (GS), 340th Engineer Regiment (GS), Co. "D" 29th Engineer Bn. (Top), 73rd Engineer Co. (LP), U.S. Dispensary, Slana, Alaska, U. S. Dispensary, Morley Bay, Y. T., and Co. "D" 58th Medical Bn. (less one platoon). The last mentioned unit was redesignated the 691st Clearing Co. (Sep) as of June 18, 1942, and later, to meet the changing condition was redesignated the Station Hospital, Whitehorse Sector, as of August 8, 1942, with the same personnel, plus a few additions. The platoon of the 58th Medical Bn. at Fort St. John was also redesignated as the Station Hospital, Fort St. John, B. C. The two (2) dispensaries at Morley Bay and Slana were operated by personnel from the Station Hospital, Whitehorse Sector, because, though equipment for them had been shipped, and though they were badly needed, were not authorized or activated until November 30, 1942.[1]

The task of the medical units of this command was to supply medical service to all units of the Alcan Highway Project. The chain of evacuation was from the various Regimental Aid Stations to the fifteen (15) bed Dispensaries, thence to the Station Hospitals at Whitehorse and Fort St. John. The Dispensaries were equipped to do Major Surgery, but their limited capacity necessitated early evacuation of patients to the Station Hospitals. As mentioned in the above paragraph, evacuation was for a good part by air, especially in the early stages of the road's construction; utilizing the two planes operated by this headquarters. Emergency evacuation to the United States was made possible by the cooperation of the 7th Ferry Command. Serums and medicines were also supplied via plane to subordinate units from the medical supply, Whitehorse Sector, located at the station hospital, Whitehorse Sector. Routine supply and evacuation especially in the latter part of the year when the road was further developed, was by truck and ambulance.[1]

The station hospital for the Whitehorse Sector was set up by the end of 1942 as a one-hundred (100) bed unit with a twenty (20) bed expansion. Due to the excessive crowding the daily census rarely dropped below eighty-five (85) patients, no elective surgery or medical work was performed. Cases were evacuated routinely to Barnes General Hospital, Vancouver, Washington, via boat. Emergency cases were evacuated by plane to The Station Hospital, Fort Snelling, Minnesota.[1]

2. STATION HOSPITAL WHITEHORSE

On 26 March 1942, a clearing platoon of the 58th Medical Battalion set out from Camp Claiborne, Louisiana on a mission to a then unknown destination, laconically designated as a "sub-arctic region." Most of the members of this unit, including its commanding officer and one other medical officer had been together for more than a year since the activation of the 58th Medical Battalion at Camp Blanding, Florida on February 12, 1941. Together these men had gained the invaluable experience of both the Carolina and Louisiana maneuvers of 1941. They were, therefore, well prepared both in experience and in equipment for whatever was to come. Just prior to leaving Camp Claiborne, five other officers were assigned to the unit, fulfilling the Table of Organization allotment of officers and men.[1]

With only a three day interval at Camp Murray, Seattle, Washington where the unit was fully equipped with arctic apparel, they finally arrived at Skagway, Alaska on April 10, 1942, via the Inland Waterway on the S. S. North Sea of the Alaska Steamship Company.

At Skagway, after a conference with General Hoge, this unit was informed that its destination would be Whitehorse, Yukon Territory, and that its function would be to provide medical attention to troops and civilians on the Alcan Highway.[1]

At this time, many service units had already arrived at Skagway without attached medical personnel. There was, already, quite a backlog of sick awaiting medical care. A temporary dispensary was set up in an abandoned plane hanger on the town's outskirts, and on the second day, twelve patients were bedded down and were being treated. Improvised clinical charts were maintained from the very first so that a thoroughly complete account of the medical function would be available.[1]

On April 15, 1942, the clearing platoon arrived at Whitehorse by way of the White Pass & Yukon Railroad. One medical officer and several attendants remained behind in Skagway to administer to the troops that were sick, until such time as they could be capable of being moved to Whitehorse.[1]

In Whitehorse, facilities were immediately prepared for treating the sick and wounded on a large scale. The assigned area was on a plateau overlooking the town approximately one and one-half (1½) miles

north of the airport. The ward and pyramidal tents were set up to suit the immediate needs. On the second day after arrival there were twenty-two (22) bed patients. Extra cantonment area conditions particularly with regard to water supply and sewage disposal in Whitehorse were very unsatisfactory at this time. The problem of sanitation, of feeding patients and personnel, of heating ward tents, of maintaining heated latrines, of improving the physical condition of the field hospital so that major surgery could be performed in greater safety and many other problems of this nature were met with cooperative ingenuity and vigor.[1]

On 26 April 1942, the Sector Surgeon arrived. He was instrumental in facilitating the procurement of necessary buildings and supplies.[1]

In a very short time the clearing platoon was functioning as a station hospital. The services included an Admission and Sick and Wounded Office, Dispensary, Laboratory, Dental, X-Ray (the field x-ray unit functioned efficiently from the start), Operating Tent, Surgical and Medical Wards. Showers were improvised for patients and enlisted personnel; the laundry problem was met by purchasing a washing machine from company funds; separate heated latrines were located distally from the kitchen for officers, enlisted personnel, patients and venereal disease cases. Field Medical Records were kept on all cases. A great many patients arrived by plane from a distance as great as five hundred miles. The plane was the only means of evacuation at that time.[1]

It became apparent at an early date that facilities would have to be expanded to adequately care for the influx of engineer troops and civilian workers. An old, decrepit-looking gymnasium building was taken over on 15 June 1942, in the town of Whitehorse. With a few innovations, the building was converted into a respectable looking hospital. There were no plumbing or kitchen facilities. The kitchen and supply tents were set up in a field adjacent to the building. It was far from an ideal of an adequate hospital but it constituted a definite improvement over the tent installations.[1]

On 18 June 1942, this unit was designated the 691st Clearing Company (Separate). It was actually functioning as a station hospital and this fact was recognized, when on August 8, 1942, it was re-designated a Station Hospital Detachment of one hundred (100) beds. Conversion from a field unit to a fixed station hospital was then complete. During the process of this conversion, the officers, had trained the enlisted personnel in the multitudinous specialized duties requisite to an efficiently operating hospital. Surgical technicians capable of assisting in major operations had achieved

the state where the utmost reliance could be placed upon them; medical technicians, laboratory technicians, ward attendants, dispensary assistants, pharmacy and medical supply clerks and office personnel conversant with medical records--all of these were trained from the ground up under the direct supervision of the officers assigned to the various departments.[1]

The officer allotment of the Table of Organization was filled on September 29th with the arrival of one medical corps officer and two medical administrative corps officers. The station hospital with the commanding officer as sector medical supply officer functioned simultaneously as sector medical supply for all the troops and civilians in the area. At no time was there a shortage of vital medical items. Channels of medical supply (Seattle Port of Embarkation) functioned smoothly and delays, necessitated by transportation difficulties, did not cause an inconvenience due to the ninety day level of supplies that was maintained.[1]

As the engineer troops progressed in their task of pushing a passable road through a wilderness of muskeg, glacier, rock and trees, lines of evacuation lengthened. The sick and injured had to be transported over ever-lengthening lines. Regimental medical facilities were thinly spread over the routes and where one unit found it practicable to evacuate by ambulance, another, located closer to a landing field would radio for a plane. On innumerable occasions, a pontoon plane carrying a medical officer from the station hospital set out for one of the rivers or lakes (Takhini River, Lake Kluane, Slims River, Donjek River or White River) to bring in a soldier or civilian afflicted with an acute appendicitis attack, or an accidental gunshot wound, or some other serious illness or injury. Occasionally, due to weather and road conditions or condition of patient, evacuation was postponed until the earliest opportunity but at no time was a soldier's life jeopardized due to delay in evacuation.[1]

An incident occurred on the night of November 16, 1942, worthy of mention. A radio call came in from the regimental surgeon of the 18th Engineers, then located at the Donjek River, two hundred and fifty miles north of Whitehorse, that a soldier was stricken with a ruptured appendix. Pilot Leslie Cook, well known Canadian bush-flyer, and two of our medical officers responded to the call. In the dead of night, at twenty degrees below zero and in the face of a high wind, pilot Cook landed in an improvised field outlined by the headlights of cargo trucks. With the chest of sterile instruments and equipment that had been taken along, the operation was soon performed successfully.[1]

The Arctic winter was approaching apace. It was painfully obvious that the building occupied at this time would be woefully inadequate for hospitalization purposes during the cold weather. Plans were made to divert a fifty (50) bed expansion unit, at first intended for the United States Public Health Service, for Army use. Erection of this building with additions to make sufficient space for one hundred (100) beds proceeded slowly. But finally, after numerous delays occasioned by lack of building material, facilities were far enough advanced to permit occupation. This occurred finally during the last week of November. There were still many deficiencies as regards plumbing, water supply, and sanitary facilities in general but sixty degrees below zero temperatures held no terrors.[1]

The unit that started out from Camp Claiborne has evolved into a well-built, cohesive, efficiently-functioning station hospital. The enlisted men and officers evinced the utmost pride in their accomplishment. The knowledge of a job well done was inherent in their attitude, their unceasing cooperative spirit, their sense of individual enterprises.[1]

3. FORT ST. JOHN SECTOR

The Fort St. John Sector started operations in March 1942. Sector Headquarters, including the surgeon's office, was established at that time but was not officially activated till July. The mission assigned to this task force was the construction of a military highway from Fort St. John, British Columbia, through Fort Nelson, British Columbia, to the vicinity of Watson Lake, Yukon Territory, a distance of approximately six hundred and fifty (650) miles, where it was to connect with the road to be constructed by the Whitehorse Sector of the Alcan Highway.[1]

In mid March 1942 the engineers organization and detachment of the services numbering approximately two thousand (2000) men arrived in Dawson Creek. The majority of these troops were entrucked for Fort Nelson for the construction of the Fort Nelson, Watson Lake section of the highway. Sector headquarters was established at Fort St. John.[1]

The medical personnel included in this contingent were the medical detachment of the Engineer regiment, which accompanied that unit to Fort Nelson, and one platoon of a clearing company. A detachment of one officer and three enlisted men from this platoon established and operated a dispensary at Dawson Creek. The platoon, less

the above detachment, established a provisional station hospital at Fort St. John, for definitive treatment of the military personnel in the Sector, there being no higher echelon of medical service in the general vicinity, and transportation facilities for prompt evacuation to the continental United States being entirely inadequate.[1]

The equipment of the medical detachment at Fort Nelson was augmented by air shipment of a fifteen (15) bed dispensary to that unit in April, 1942. The facilities of the Ferry Command cargo planes were used for this transportation, since the beginning of the spring thaw at this time made by the winter trail impassable. The equipment of the clearing platoon was augmented by portable, x-ray equipment, steel cots and mattresses, autoclave, field operating table, additional drugs, and other medical supplies.[1]

By the middle of the summer two additional engineer regiments and two quartermaster companies were added to the sector. The total was thus increased to approximately five thousand (5000) officers and enlisted men. This strength was maintained in this sector for the remainder of the calendar year. The strength of the Medical Department personnel was twenty-six (26) officers and eighty (80) enlisted men. Of the officers, seventeen (17) were members of the Medical Corps, eight (8) of the Dental Corps, and one (1) of the Medical Administrative Corps.[1]

The medical and dental service for the troops in the Fort St. John Sector was furnished by the medical detachments of the three engineer regiments and the clearing platoon, which was redesignated a station hospital, 100 bed, communications zone, in August. Each medical detachment operated battalion and regimental aid stations for its respective regiment. These aid stations moved at the speed of the road construction.[1]

The 15-bed dispensary, previously mentioned, was maintained in the vicinity of Fort Nelson to provide temporary quarters for patients awaiting air evacuation. Of necessity, the operating personnel for this dispensary was obtained from the regiment initially bivouaced at Fort Nelson. As the regiment advanced along the constructed road, this medical personnel became farther and farther removed from its supported troops. In October, the dispensary was moved to the vicinity of the Watson Lake airport, and its functions were taken over by the regimental aid station of another regiment which had, at that time, established its regimental headquarters at Fort Nelson.[1]

Because of the great distances involved and lack of adequate means for land transportation, patients suffering from minor sickness and injuries were treated at the aid stations or in quarters. Seriously ill patients and those suffering from major injuries, were evacuated to the station hospital at Fort St. John. The facilities of this hospital were also made available to the air corps installations at the airports of Fort St. John and Fort Nelson.[1]

Upon redesignation in August, requisition was submitted to bring this unit up to its table of organization strength. The enlisted personnel arrived in mid-December; the officer personnel had not been received at the close of the calendar year. This unit operated, therefore, at a distinct disadvantage, occasioned by the deficiency in personnel, and its highly satisfactory service throughout, makes that service that much more noteworthy.[1]

An additional strain was placed on the Medical Department by the presence in this sector of approximately four thousand and seven hundred (4700) Canadian and American contractor employees, operating under the United States Public Roads Administration. The United States Public Health Bureau provided routine medical service for this personnel, but a great deal of emergency medical and dental care was provided by the Medical Department. This was especially true along the highway, where public health facilities were not available.[1]

Evacuation has been a major problem during the entire period of this report. The regiment bivouaced initially at Fort Nelson was devoid of overland routes to Fort St. John, from March until September, when the military road to Fort Nelson was completed. Ferry Command cargo planes were used both for evacuation of patients to the station hospital and for their return to duty. The two regiments operating initially from Fort St. John used ambulance evacuation.[1]

Upon completion of the road, the regiments were directed to establish camps, at intervals of approximately fifty miles, along the highway, for purposes of maintenance and trucking. One regiment, assigned to the Fort St. John - Fort Nelson Zone, has continued the use of ambulance evacuation. The other two regiments, located between Fort Nelson and Watson Lake, continued the use of the cargo planes, from airports at both the above, for their means of evacuation, since ambulance evacuation would necessitate a period of one to three or more days travel. Additional ambulances were dispatched in November and December to augment the two in the possession of each regiment, on the basis of one ambulance for each camp allowing one in

reserve for each regiment. This brought to a total of twenty-five, the number of ambulances assigned to the three regiments.[1]

At the onset, rail evacuation of patients from the station hospital to hospitals in the United States was instituted. This procedure proved relatively unsatisfactory, since it involved a period of seven to ten days to arrange for accommodations, and train connections at intervening points enroute were very poor. As a result of these experiences, all patients, with few exceptions, were evacuated to the Station Hospital, Fort Snelling, Minnesota, by again making use of the Ferry Command cargo planes.[1]

The co-operation of the commanding officer of the Ferry Command, with headquarters at Edmonton, Alberta, in the matter of evacuation of patients was of paramount value to this sector and greatly appreciated. There were, however, specific disadvantages involved. The cargo planes are not equipped to handle patients and their cabins are uncomfortably cold, even for the healthy man. In addition, no set schedules were maintained by these planes and consequently unavoidable delay in evacuation occurred on some occasions. It is believed that two airplanes, equipped to transport patients, assigned to this sector headquarters, could have accomplished all echelons of evacuation that were found necessary.[1]

The sector surgeon recorded several noteworthy observations after the first ten months operation in this sector; [1]

1. The hospital ward tents were found entirely unsatisfactory for use in cold climate for the reason that heating them to a comfortable temperature during the cold season was practically impossible. The dust, blown about by the prevailing winds in the summer, makes major surgery in a tent hazardous for the patient. A surgical trailer for medical units that must do major surgery on the spot, would have been of inestimable value.

2. The value of air evacuation in isolated areas were never more admirably proven than in this force, where the lack of same would have resulted in a complete breakdown of evacuation from the start.[1]

3. In isolated operations of this type, an initial augmentation of the authorized Medical Department personnel by at least fifteen per cent are desirable and necessary to provide adequate service, occasioned by unforseen events and situations. This was exemplified on a number of occasions in this Sector. The regiment which supplied the personnel

for the 15-bed dispensary was placed at a disadvantage as it became farther and farther removed from that dispensary. The railhead installation at Dawson Creek had no authorized personnel, but a medical installation was required and was operated by personnel drawn from the station hospital. Numerous separate companies and detachments, without authorized medical personnel, were included in this task force. Finally, the sickness or injury of one medical officer along the extended region of operations, left a large area without the immediate service of a medical officer in the event of emergency, since no temporary replacements were available.[1]

4. STATION HOSPITAL FORT ST. JOHN SECTOR.

The majority of enlisted and commissioned personnel of this hospital received their training in the 58th Medical Battalion at Camp Blanding, Florida. This parent organization was transferred from Camp Blanding, Florida to Camp Claiborne, Louisiana shortly before the clearing platoon, later to become this station hospital detachment, was ordered to foreign duty.[1]

On March 7, 1942 the 1st Platoon of Clearing Company, 58th Medical Battalion was entrained for foreign service. On March 13, 1942 the platoon arrived in Dawson Creek, British Columbia, Canada. The temperature was below freezing, the terrain bleak and desolate, the outlook uninviting. Tents were pitched in the ice and snow and a clearing station was set up and operated for three (3) weeks at the end of which time the clearing station was ordered moved forward to Fort St. John, British Columbia, Canada.[1]

One (1) medical officer and three (3) enlisted men were left behind to staff the Dawson Creek Railhead Aid Station. The platoon of clearing company, 58th Medical Battalion set up a clearing station at Fort St. John, British Columbia, Canada which had become headquarters for the Southern Sector of the Alcan Highway. This clearing station actually functioned as a hospital. Only the most critical cases and those requiring hospitalization of extremely lengthy duration were evacuated.[1]

Hospital facilities were maintained for three (3) engineering regiments and the Headquarters, Quartermasters, and Ordnance detachments of the Southern Sector. This was a force of some five thousand (5000) enlisted and commissioned personnel.[1]

Nine (9) large ward tents and four pyramidal also small wall tents primarily for isolation cases, were set up and became the original hospital plant. Later, in May 1941, twp (2) prefabricated frame buildings similar to CCC barracks were erected and served as a nucleus for the proposed group of hospital buildings. The first two (2) buildings housed the hospital administration, dispensary, dental clinic, surgery, x-ray and laboratory besides a general surgical and a general medical ward for the more severe cases.[1]

On June 8, 1942 the clearing platoon, 58th Medical Battalion, which was operating the provisional hospital, was redesignated the 1st Platoon, 691st Clearing Company, (Separate). Then on August 12, 1942 the 1st Platoon, 691st Clearing Company (Separate) was redesignated a Station Hospital one hundred (100) bed communications zone and the Station Hospital, Fort St. John Sector, Alcan Highway, began to operate under the provisions of T/O No. 8-560.[1]

The function of the Station Hospital one hundred (100) bed communications zone was to provide definitive treatment, medical, surgical, and dental for all troops in the Fort St. John Sector who could not be given such treatment in their respective aid stations either because of the severity of the case, the length of illness, or other causes. The Engineering regiments, Quartermasters and Ordnance detachments of this sector all evacuated their casualties to the Station Hospital, Fort St. John Sector, which functions as a one hundred (100) bed communications zone station hospital, treating and returning to duty all casualties possible and evacuating to the interior only such cases that will require a very specialized treatment not here available.[1]

This hospital was organized under T/O No. 8-560 as a station hospital one hundred (100) bed communications zone, with the departments of medicine, surgery and dentistry, and a dispensary or outpatient department.[1]

The hospital was understaffed. A requisition for five (5) officers to bring the commissioned personnel up to the T/O strength had not yet been filled.[1]

There were no civilian personnel at this station hospital. The military personnel consisted of six (6) officers, four (4) medical and two (2) dental and sixty-two (62) enlisted men. The Table of Organization provided for an aggregate of seventy-two (72) including ten (10) commissioned and sixty-two (62) enlisted personnel.[1]

For a period of two (2) weeks, daily classes in operating room and sick room technique were conducted with the aid of the above mentioned civilian hospital personnel. At the end of this time the enlisted men had a surprisingly excellent grasp of the technical knowledge required. Under constant supervision of the officers the hospital functioned efficiently to a degree not often attained in most hospitals.[1]

Constant work in the operating room, the x-ray, laboratory, and in the dental clinic and wards has made our technicians and other enlisted personnel a well rounded, smoothly working, efficient machine.

The medical service consisted of medical and surgical cases which could not be treated on the spot by the individual aid stations of the various regiments. Four medical officers and two dental officers comprised the commissioned personnel of the hospital. Of these one medical officer had been stationed at the railhead dispensary leaving only three medical and two dental commissioned personnel to operate the hospital.[1]

The medical cases were many and varied, ranging from yellow jaundice to the occasional psychatic problem and including upper respiratory diseases, genito-urinary and venereal diseases, peptic ulcers, numerous cases of arthritis, and the occasional dermatitis and frost bite.[1]

The surgical cases consisted of appendicitis, hernia, hemorrhoids, burns, traumatic injuries, tonsillectomies, etc.[1]

A Medical laboratory and X-Ray department were maintained and operated to the fullest extent.[1]

The dental service consisted of routine dental work in addition to fitting prosthetic appliances, and dental surgery. Due to the fact that much of the personnel left the U.S. without having the proper dental care, there had been an enormous load on this department.[1]

The dental clinic had a dental laboratory and a dental X-Ray unit, both of which were fully utilized.[1]

There were no veterinarians and no veterinary service in this section. None were required since the force is motorized and had no animals in the service.[1]

5. EDMONTON STATION HOSPITAL

On 17 May, 1943, Major W. T. Joyce arrived in Edmonton, at which time contact was made with the construction foreman of Metcalf-Hamilton, Kansas City Bridge Company, the construction company in charge of construction of the hospital. A copy of the plans was turned over to him and after conference with the District and Division Engineer several alterations and additions were suggested. Alterations consisted of putting a concrete floor in the morgue with running hot and cold water, and the request for a theatre of operations type of building for patients recreation and convalescence. It was noted that no provisions were made in the construction plans for a medical laboratory, so that it was necessary to utilize half of the space alloted for pharmacy with the accompanying changes and alterations that are peculiar to a medical laboratory.[1]

A Medical Administrative Corps officer arrived on 25 May 1943. closely followed by a cadre of twelve enlisted men. In June more officers and enlisted men arrived and on the 9th of July nine nurses arrived. The nurses worked beside the officers and men in cleaning the hospital, and immediately started to prepare the wards for utilization. Lap sheets, and necessary dressings were made by the nurses to enable the surgery to handle any type of operation immediately after activation.[1]

Prior to activation the unit had set up their mess hall and personnel office, arrangements were immediately made with the quartermaster to procure food for the enlisted men and officers that were present, and with the finance officer to pay the troops although we were not assigned or attached to any other unit then stationed in this area. No reports were submitted on either the personnel or the functions until after activation.[1]

This hospital has functioned as a station hospital and as a stopping off point for casuals, troops and civilians, from the Northwest Service Command, Alaska Defense Command and Army Transport Command. Travel orders have had to be changed so that patients that were to have been evacuated all the way to the United States by air would be transferred the remainder of the way by train as this was the terminus for the air evacuation command. At one time there were 34 enlisted men (colored) transferred to this hospital for evacuation and further treatment from a regiment that was shortly returning to the United States. These soldiers after receiving treatment were returned to their original unit in the United States.[1]

The total commissioned personnel as of the last of the year was as listed below:[1]

	Major	Capt.	1st Lt.	2nd Lt.
MC	1	5	2	
DC		2		
MAC		1	3	1
ANC			2	16
PTA				1
MDD				1

The enlisted personnel was as follows:

Allotted	150
Actual	147

There were no civilian employees hired through the Medical Department although there were civilians working in the hospital boiler room, hired by the post engineer.[1]

The personnel assigned to this unit were very satisfactory.

A training program was instituted lasting 12 weeks. It was taken from the service command training program with alterations being made by taking such classes as infantry rifle drill, defense against air attack, and removing them from the curricular and adding nursing, first aid, anatomy and physiology, Medical Department records and litter drill. A blackboard was constructed and used by the instructors, Medical Department officers and nurses, in their lectures. References were taken from training and field manuals, and from the medical library which, although small, gave adequate reference material.[1]

Training films were obtained from the central film exchange and as they were received they were shown to make certain that all hospital personnel could see them. During the winter a course in litter drill and ambulance loading was held to train the officers and men in the handling of the litter under adverse weather conditions.[1]

Quartermaster equipment for 250-Bed, station hospital, cantonment type (in accordance with T/E 8-560) was inadvertently shipped per SGO requisition No. 200298-F, under date of June 3, 1943.[1]

The above equipment was shipped in lieu of quartermaster equipment listed in Section VII, T/A - 20, WD, Washington, dated 10 March 1943.[1]

The quartermaster equipment authorized under section VII, T/A - 20, required for this organization was requisitioned on the basis of an approximate strength of two hundred (200). (Officers and enlisted men). This equipment was promptly shipped by the Chicago Quartermaster Depot.[1]

Ordnance equipment for a 250-Bed, station hospital, cantonment type (in accordance with T/E 8/560) was asked for on SGO requisition No. 200298-E, under date of June 3, 1943.[1]

These vehicles did not arrive at this station until August 30, 1943. The hospital was activated on August 5, 1943.[1]

Medical Department equipment and supplies as prescribed in Medical Department Equipment List, i.e. Item 97317 Station Hospital, Cantonment Type, ZI, 250-Bed in amounts calculated for nine (9) months supply were appropriate for this station, except certain surgical forceps, sounds and dental laboratory items. These items were approved by the Surgeon General's Office on requisition and have been received.[1]

Excellent warehousing facilities are available for the safekeeping of all medical supplies required for storage at this station.[1]

Medical supplies and equipment asked for on requisitions have been adequate to meet the needs of this hospital. All medical equipment and supplies required for the treatment and care of the sick that were requested on requisitions were approved.[1]

Medical supplies which exceed the requirements of this station were turned over promptly to the Northwest service command medical supply point for disposition.[1]

All requisitions submitted to the distribution depot, i.e., Chicago Medical Depot, (through the Northwest Service Command Distribution Point, Edmonton) have been promptly filled.[1]

One of the major problems after solving the supplies for the hospital was adequate training of personnel for duties within the hospital. This was overcome when classes were held by the nurses in elementary nursing, bed bathing, temperature, pulse, and respiration, forms of medications, giving of enemas, hypos, making of trays, and other subjects that aid in the proper care of patients. Good co-operation was shown by the instructors and the pupils.[1]

The dental service of this hospital was furnished by two dental officers and three enlisted men.[1]

All types of dental work including oral surgery, operative dentistry, prosthetics and crown and bridge work, exodontis, X-ray, and prophylactic dentistry were done in this hospital.

The number of troops who have nonrestorable teeth was quite low. Troops with impactions and malposed teeth which cause local symptoms are numerous. Noninfectious gingival diseases occur very frequently, probably due to poor mouth hygiene. Vincent's Stomatitis has occurred regularly but not frequently enough to be termed epidemic.[1]

6. STATION HOSPITAL DAWSON CREEK

This organization was activated 1 September 1943 and was designated that date as Service Unit 2409, located at Post of Dawson Creek, B. C. Service Unit 2409 absorbed both personnel and equipment of the Post Dispensary, Post of Dawson Creek, and from Station Hospital, APO 701, Seattle, Washington, located at Fort St. John, B. C., both of which were inactivated 1 September 1943.[1]

Station Hospital, APO 701, Seattle, Washington, had been functioning as a hospital since August, 1942. The Post Dispensary had been functioning since March, 1943, and evacuated all patients for hospitalization to Station Hospital, APO 701.[1]

Service Unit 2409, was activated to operate a new hospital installation for the post of Dawson Creek. The designated table of organization called for personnel of a Hundred (100) bed station hospital. However, since the medical branch of the Northwest Service Command was operating on an over-all allotment basis for Medical Corps and Medical Department personnel, it was deemed advisable to supplement the authorized table of organization with sufficient personnel to operate the installation. At the end of the year, there were eight (8) officers of the Medical Corps; four (4) officers of the Dental Corps; five (5) officers of the Medical Administrative Corps; thirteen (13) officers of the Army Nurse Corps; one (1) Physical Therapy Aide and one hundred twelve (112) enlisted men. There were no civilian employees of the hospital. The hospital staff as listed above was entirely adequate and was quite versatile in professional qualifications, to such an extent that, with few exceptions, any eventuality requiring medical attention can be handled in this hospital.[1]

Enlisted personnel were continually undergoing training both through actual work and through an organized training program which consists of one-hour class periods daily for six days of the week. In addition, there was an orientation program, which was given concurrently with the regular training schedule. Commissioned personnel of the hospital staff conducted the classes and liberal use of training films, film strips, and practical demonstrations had been made. The enlisted personnel were very efficient in their duties and many could be classified as being very highly trained.[1]

All of the hospital equipment was of the Zone of Interior type. It was generally of the best quality and the most modern that could be obtained. In type and quality of equipment, special references can be made to the equipment of the laboratory, pharmacy, dental clinic, surgery and the X-ray department, all of which was excellent and which would fulfill any demands which could be placed on it.[1]

Medical supplies were available in sufficient quantity. There had been no difficulty in obtaining supplies or having requisitions filled promptly. The approximate time for having requisitions filled was sixty (60) days and stock levels were adjusted to allow for this period of time. Supplies were uniformly excellent in character and the methods of shipment were good.[1]

The Post Hospital comprised nineteen (19) buildings of the standard cantonment type found in military hospitals. It was excellently equipped and left little to be desired in providing medical and dental service to anyone requiring these services. The professional staff of the hospital was very well balanced and was equipped to handle any eventuality which might arise.[1]

The dental clinic was very modern and had the best equipment available anywhere. There is sufficient equipment and supplies to do any type of dentistry which might be required. A chair dental survey was made of every organization on the post and a well-organized dental program was in operation.[1]

7. STATION HOSPITAL SKAGWAY

The Station Hospital, APO 985, Skagway was activated as such on 16 December, 1943. Prior to this it was called by various names such as: Station Hospital, Port Hospital, Port Surgeon's Office, and Port Dispensary. Prior to September, 1942, there were no troops stationed

permanently at APO 985. A few companies of engineer troops operated the dock for a short time during March and April, 1942, and then went on up into Canada to build the Alaska Highway. The Alaska communications system had been here for about twenty years. Its personnel and the troops here temporarily were serviced by a civilian physician at the White Pass and Yukon Route Hospital. The Subport of Embarkation was activated 15 September 1942, as a Subport of Seattle Port of Embarkation. Its purpose was to trans-ship materials and men over the W.P. & Y. R. to Whitehorse, Y.T., for the construction of the Alaska Highway and the Canol Pipeline and Refinery. The docks and various port activities were serviced by two companies of the 375th Port Battalion, of the Transportation Corps, and a Headquarters Company. The Coast Guard, consisting of about twenty men and one officer, and one company of the 761st M.P. Battalion, and the 770th Railway Operating Battalion, mentioned below, comprised the rest of the military strength at this Post. The Port Hospital was established 15 September 1942 when the White House, a guest hotel, was taken over by the Army. It was a frame two-story structure which had a bed capacity of twenty-three. It was of sound construction and weatherproof, and although heated by oil stoves and coal, was warm. It had three bathrooms, with toilets and a shower, and a good-sized kitchen for preparing meals. It also had a two-story building in the rear which had been a garage that could be used as a pharmacy and supply office. Only the simplest of medical and surgical care could be given with the limited facilities and few supplies available at that time. No laboratory work, X-rays or surgery was possible here. Those requiring surgery or X-ray work were taken to the White Pass & Yukon Route Hospital, a civilian hospital run by the railroad.[1]

The function of the Port Hospital was to take care of all personnel at the Post. The medical staff consisted of two Army Medical Corps officers, a major and a 1st Lieutenant and two Army Nurse Corps 2nd Lieutenants. Thirteen enlisted men, who were all drawn from the companies of the Port Battalion, made up the medical detachment. Most of these had had no training whatsoever along medical lines and were substandard physically. The detachment men were housed in a steel Butler hut erected on the property, just to the rear of the hospital. The hospital was enlarged by the erection of two Nissen huts, adjacent to the medical detachment hut, in January 1943, and this took care of the overflow of patients during the early winter. In January, 1943, one of the rooms upstairs of the hospital was remodeled into a surgery, and later one of the wards was remodeled as a four-bed surgical ward. By this time, we had laboratory facilities, a field X-ray unit and a small, but well-equipped surgery. The staff consisted of three Medical Department captains, and later a major and two captains. The

Nursing staff was enlarged to three and later six, and the medical detachment to thirty enlisted men. In April, 1943, an addition to the hospital, consisting of offices, X-ray, laboratory, and fifteen private rooms and two latrines and shower rooms were erected. It, together with the one Nissen hut, gave the Hospital a forty-five bed capacity which could easily be expanded to fifty beds. This was in use by the last week in April, 1943, and is now being used for the administrative part of the hospital and for isolation. The dispensary was established in September, 1942, in a store rented from the Bank of Alaska. Sick call was held twice daily, a large percentage of the cases being respiratory due to the freakish weather in this section. In January, 1943, the Dental department took over part of the dispensary until a new dispensary was constructed in April, 1943. The new dispensary consisted of a modified Nissen hut, consisting of several rooms and a large space at one end which was divided for the use of the Dental department, and the remainder for offices, medical, surgical, ear, nose and throat, prophylaxis, physiotherapy, eye refractions, and a small pharmacy with a waiting room adjacent to it. Prior to April, 1943, there were no facilities for eye refractions and prescribed some seventy pairs of spectacles, using the standard trial lens case. The 770th Railway Operating Battalion came to this station in the summer of 1942, and assumed the operation of the White Pass & Yukon Route. Their medical facilities consisted of a small dispensary adjacent to the White Pass Hospital. The staff consisted of one medical corps captain, one dental corps lieutenant, and about twelve enlisted men. They had the facilities of the White Pass Hospital for all cases requiring hospitalization. When the Post of Skagway was taken over by the Northwest Service Command, this dispensary began to hospitalize its patients at the present station hospital.[1]

The Station Hospital, activated 16 December 1943, had a personnel of three medical officers, one major, one captain, and one 1st lieutenant, two dental officers, captains, one Veterinary Corps captain, attached to the hospital, three Medical Administrative officers, two 1st lieutenants and one 2nd lieutenant, twelve army nurses, two of whom were on detached service at Chilkoot Barracks, and one on emergency leave, and 107 enlisted men. There were no civilian personnel employed by the hospital.[1]

A formal course of lectures was given during the months of April and May, 1943, covering most of the practical phases of medicine, surgery, nursing and the use of drugs. This consisted of a series of lectures of thirty hours instruction by members of the staff. This was supplemented by practical demonstrations in first

aid and evacuation of patients, in case of major disaster or bombing. Our first laboratory technician, Cpl. Fitzgerald, was given an opportunity to take a three-week's course in laboratory training and public health investigation at the Territorial Health Department at Juneau, Alaska, during February and March, 1943. The remainder of the enlisted personnel have received constant instruction by the various members of the staff until the present time when the whole staff functions as a smooth working unit.[1]

Equipment at the station hospital was adequate for a fifty-bed hospital. Well-equipped but rather small surgery and surgical unit, field X-ray unit, laboratory facilities, pharmacy. New station hospital for 100 beds with fifty-bed expansion. Medical supplies were formerly supplied to this station by automatic maintenance. The suitability of the supplies thus obtained were for the most part satisfactory. In the event that there were any supplies not furnished in the medical maintenance unit, it was possible to requisition them. No particular trouble was experienced with special requisitions. During the period in which this station received supplies by automatic maintenance, the common thing was to be overstocked. At no time could it have been said that supplies were inadequate, with the exception of possibly the first weeks of the station's inception. After the station had been in operation for about six months, the supply situation became a problem due to the lack of proper personnel for handling records to promote the proper stock record control. As a result, excesses accumulated to the point where it became a considerable problem to properly warehouse them. The situation was temporarily alleviated by using some of the buildings of the new station hospital which were then under construction.[1]

During the early days of the hospital, the problems were chiefly those of sanitation including inadequate housing. Marked overcrowding lack of heating, lack of proper messing facilities, poor refrigeration and storage, inadequate supply of running hot water, inadequate latrine facilities, and what plumbing existed was always out of order, improper disposal of sewage and waste. The original hospital was a building some forty years old, of sound construction but plumbing old and faulty. The latrines were always overflowing and the cesspool to the rear of the hospital between the latter and the Butler hut for the hospital detachment was overfilled. The contents were often spilled all over the yard giving off very offensive smell that bother both patients and staff as well. The cesspool had to be pumped out frequently and filled constantly with chlorinated lime. It could not be re-dug because the ground was too solidly frozen at this time of the year. Overcrowding at the hospital

during the early days required additional space. This was provided for by the erection of a Nissen hut to the rear of the original hospital building. Later a wooden addition was built. Messing facilities were very inadequate. At first, we had one broken-down coal stove, supplemented by a small electric stove in the kitchen. The kitchen itself was small, there were inadequate equipment for feeding 35 patients, 30 enlisted men of the detachment and the Officers and Nurses. Consequently the latter had to eat in a consolidated mess several blocks away from the hospital. Furthermore, there was no place to store perishables except in a very small refrigerator. The remainder was stored in a cool cellar and the rest kept in a cold storage refrigerator where the consolidated mess drew its supplies. Frequent withdrawals were necessary. In March, 1943, the kitchen was enlarged and a large range installed. At the same time we received three fairly large kerosene refrigerators. In June, 1943, the new refrigeration plant was in operation. The hospital could draw its supply of perishables daily from this place. Despite all these handicaps, neither the health or morale of the men suffered to any great degree. There was no great increase in the sickness rate and no epidemics of food or water-borne disease existed. In September, 1943, heavy rains and melting snows caused the river to overflow, washing away parts of the new hospital under construction and burying equipment in many feet of mud and silt. A dike was built to prevent further action of flood on the hospital buildings. Despite great damage to property, both to the new hospital and town as well, the men fighting the floods suffered neither from overwork or exposure.[1]

Medical, Dental, and Veterinary Service:

a. Medical: Service adequate for fifty-bed hospital. All usual procedures of medical, surgical care, with routine urine, blood, stool, gastric contents, sputum, spinal fluid, microscopic study of smears and cultures. No facilities were available for Wassermann and Kahn. X-ray all usual types including GI series and intravenous urography. No gall bladder series for lack of proper drugs. Surgery, emergency surgery of all types; some elective surgery. No equipment for urological surgery.

b. Dental: When Port of Skagway was activated in September, 1942, there were no dental officers assigned. Two dental officers arrived 29 October 1942 as the first Port dental officers. They had no equipment to work with except a dental officer's and enlisted man's field kit. There was a great deal of dental work necessary because most of the men were limited duty, averaging about thirty years of age, and having had very little dental treatment previous to being sent on foreign duty.

A very old type of dental chair was acquired from the local dentist and this, plus the officer's and enlisted man's field kits, was the equipment. About a month after first arriving an incomplete field chest 60 was obtained from the 770th Ry. Optg. Bn. which had an extra one. The first dental clinic was operated at the Bank building in conjunction with the dispensary. Two moves were then made prior to moving into the Nissen hut dispensary. It was then made possible to obtain some dental supplies and equipment from the U. S. Engineering Department that the dental clinic was able to operate fully with two chairs. With very limited facilities, a denture service was instituted about April, 1943, which at first consisted of repairs and then expanded out into full dentures, partial dentures, fixed bridges, inlays and repairs. This dental clinic has been doing prosthesis for the 770th Ry Optg Bn and had done some of the laboratory work for several other stations in the Northwest Service Command.

c. Veterinary: The Veterinary Service at this Post was inaugurated June 1943, with a captain, VC, as Post Veterinarian in Command. The Veterinary Detachment was activated 16 December 1943, consisting of a captain and four (4) enlisted men. This detachment was attached to the station hospital, for rations, quarters, and administration, and have their office at the station hospital. Principal duties of the Detachment is the inspection of all perishable subsistence which includes meats, butter, milk, eggs, and fruit and vegetables at this post as well as all perishable subsistence coming through this post for trans-shipment to military and civilian personnel in the Yukon Territory and the Northwest Service Command. The veterinary detachment inspects all perishable subsistence in the QM warehouse and cold storage reefers at this post. It is the duty of the detachment to condemn as unfit for human consumption any subsistence which is found not to be in the proper condition. The Veterinarian at this post in addition to his regular duties has been acting Post Sanitary Officer. These duties included inspection of mess halls, latrines, and all public restaurants.[1]

Construction was begun on the new station hospital on 2 July 1943. It was located three miles north of the town Skagway near the Skagway river. It was ready for occupancy in the Spring of 1944. Its construction consisted of multiple single story units all inter connected. It was originally planned as a 100-bed unit with room for 100% expansion, if necessary. On 15 January 1943, the United States Engineering Department took over the medical service of the civilian personnel in this area. The more serious cases and emergency surgery were hospitalized at the station hospital as was typical of the agreement made between Northwest Division, U. S. Engineer Department and the Northwest Service Command.[1]

CHAPTER 3

Medical History Subsequent to Establishment of Fixed Facilities

The year 1943 found a number of medical services for War Department personnel in this area. At that time coordination was lacking in care of civilians, due principally to the inability to obtain sufficient medical officers to adequately staff the U. S. Engineer Department Health Service in the Northwest Division.[4]

The Army had its Station Hospitals established at Whitehorse and Fort St. John and had field coverage of military personnel. The contractors had six "non Public Health Service" doctors on their payrolls. Bechtel-Price-Callahan were hiring first-aid men for employment on the project and at salaries above Civil Service standards. The basic working agreement at that time did not place the employment of all first-aid men under the Division Health Service. The United States Public Health Service had medical and sanitary engineer personnel in the area under Public Roads Administration almost to the end of the calendar year. These professional men were, however, within limited control of the Division Health Service, pending the procurement of Army officers as replacements.[4]

The Northwest Division had established 6 Medical Districts and a number of sub-Districts defined as Medical Areas. These were not in full scale operation until late in 1943 when additional medical and sanitary officers were made available from the States. District medical officers were then assigned to Dawson Creek, Prince Rupert, Fairbanks, Skagway, Whitehorse and Edmonton. Area medical officers were assigned to Norman Wells, Canol, Waterways and Fort Nelson. The last took over the Kerr Hospital site previously established by PRA as a U. S. Public Health Service installation.[4]

All medical units had assigned spheres of responsibility. Thru the year 1943 the Northwest Division Health Service and the PRA (USPHS) under the U. S. Engineer Department cared for practically all civilian personnel up to the point where extended hospitalization was required, whereupon the Northwest Service Command Station Hospitals were utilized. There were occasions when the Station Hospitals were not accessible and civilian hospitals were used. A satisfactory working agreement on hospitalization had been arranged between the chief of the medical branch (Service Command Surgeon) and the Division medical officer.[4]

The Northwest Division established dispensaries at Jesuit College, Edmonton, Dawson Creek, B.C., Whitehorse, Yukon Territory, Prince Rupert, B.C., Macrae (Whitehorse), Yukon Territory, Skagway, Alaska, Fairbanks, Alaska, Johnson's Crossing, Yukon Territory, Kluane Lake, Yukon Territory, Tok Junction, Alaska, Fort Nelson, B.C., Canol Camp, Northwest Territory, and Norman Wells, Northwest Territory. In addition to these there were first aid stations too numerous to mention, due to the progress of construction and the many inevitable locations of various camps.[1]

The functions of the Division's Health Service are described in Northwest Division Circular Letter No. 39, subject: "Department Health Service", dated 27 February 1943, which was circulated to all District and Area Engineers, Contractors and others concerned. A copy of this Circular Letter is embodied in Chapter 13 "Immunizations" of this history. The functions of the Engineer Health Service, Northwest Division, were reiterated in correspondence from the Chief Health Officer, U. S. Engineer Construction Forces to the Military Construction Branch of the Office of the Chief of Engineers, under date 1 June 1943, which stated:

(1) The Engineer Health Service, Northwest Division is organized to provide the medical service guaranteed to the employees of contractors engaged in construction in the Northwest Territory. It also renders medical services to U. S. Engineer Department employees allied with contractors in construction work in the same area.

(2) Complete medical care including denistry is provided for all American nationals without charge, except for conditions due to the employees' misconduct. Medical care required because of incidents arising from the misconduct of the individual is also provided at cost plus 20 percent to the individual. Medical care is provided to Canadian nationals in areas where no facilities other than those of the Engineer Health Service are available.

(3) The Engineer Health Service is responsible for the sanitation of the area included in construction projects. Personnel of the service includes officers of the Sanitary Corps who are responsible for the sewage, food, water, garbage disposal and who make inspections at regular intervals.

(4) In addition, a most important part of the medical care program is that of physical examinations and immunizations. These are given to all employees on the project and are a requirement before an individual can be employed. Physical examinations in the United States are given at nine medical examination offices in strategic cities. These offices are staffed by regular medical officers. All employees must pass a thorough physical examination including specific laboratory tests before being qualified for travel to the project. Employees are immunized against typhoid, tetanus and smallpox. The service is also responsible for giving a physical examination to employees leaving the project and for determining whether or not specific individuals are entitled to a medical discharge.

(5) Medical care is provided in small dispensaries and hospitals that are strategically located and which are for the most part mobile to conform with construction activity. Each area in which there is a group of laborers is provided with civilian first-aid men, as well as with ambulance service to a hospital or dispensary. In areas where permanent army installations of the Northwest Service Command have been activated, cases requiring extensive hospitalization are turned over to these army installations. In areas where there are troops but no Northwest Service Command facilities, medical care is provided to troops by the Engineer Health Service. Nursing care in hospitals are given by civilian male and female nurses.

(6) Most of the Army medical personnel of the Engineer Health Service have had previous experience working with construction forces. They have developed policies and procedures in handling the civilian laborers following experience gained at other bases. They are committed to a program of providing good medical care that is within reach of every laborer and they have been trained in the preventive and the curative aspects of the medical program. These officers have had extensive contact with associated insurance companies and compensation commissions. They have had considerable experience in industrial medicine of the type seen on foreign construction projects.

(7) Ten medical, sanitary and dental officers of the Public Health Service have been assigned to the Engineer Health Service. This has simplified the administration of the whole service. These Public Health Service officers are providing service to a specific area in the Northwest

Division. The unity of direction accomplished by attaching the Public Health Service officers to the Engineer Health Service is assuring better medical care to all concerned.[4]

By the close of 1943 the Northwest Service Command had fully equipped station hospitals functioning at Skagway, Chilkoot Barracks, Whitehorse, Edmonton and Dawson Creek. The last installation replaced the Station Hospital at Fort St. John some fifty miles to the north of it. The Command also had a Service Command laboratory which had been activated on 5 August 1943. This unit was short lived, being in operation as such only until 31 March 1944. The functions of the Northwest Service Command medical laboratory are contained in a memorandum, that title, dated 12 November 1943. A copy of the memorandum is appended to this chapter.[4]

Elements of four U. S. Federal medical agencies had been functioning within the geographical limits of this Command until the end of 1943. These agencies were as follows:

(1) The United States Public Health Service, attached to the Public Roads Administration.

(2) The United States Engineer Department Health Service.

(3) The Medical facilities of the Alaskan Wing, ATC, USAAF.

(4) The Medical facilities of the Northwest Service Command. [1]

The last elements of the U.S. Public Health Service left this Command by the end of the year. All medical facilities of the Public Roads Administration were absorbed by the U. S. Engineer Department Health Service.[1]

The Health Service of the U.S. Engineer Department was officially abolished on 2 March 1944 with the amalgamation of the Northwest Service Command and Northwest Division Engineer facilities. However, the absorption of personnel and facilities of the U.S. Engineer Department Health Service was not completed until about 1 July 1944. Medical officers of the U.S. Engineer Department Health Service were relieved by the Chief of Engineers and transferred to the Northwest Service Command on 29 April 1944. The consolidation left two medical agencies operating in this territory. They were the Northwest Service Command Medical Branch and the medical facilities of the Alaskan Wing, which had then become the Alaskan Division, ATC, USAAF.[1]

At the time of amalgamation the Northwest Service Command Medical Department was strictly military, the U.S. Engineer Department Health Service, except for officers was strictly civilian; and the U.S. Public Health Service under Public Roads Administration was non-existent.[1]

At this time the Northwest Service Command had about 550 medical corps enlisted men, and the U.S. Engineer Department Health Service employed 174 civilians. Therefore, exclusive of officers the two services had 550 enlisted men and 174 civilians or roughly 724 employees. At the end of the year the Northwest Service Command Medical Department had a total of 125 enlisted men and 200 civilian, or 325 employees. The personnel comparison thus follows:[1]

	No. of Officers	No. of EM	No. of Civs.	Total
1 Jan. 44	208	550	174	932
31 Dec. 44	58	125	200	383
	150	425	-26	549

Net reduction: 549

This consolidation of medical services and reduction in personnel was in keeping with letter Hq. ASF, SPAOD, 10 February 1944, subject: "Curtailment of Operations and Reduction in Personnel and Equipment, Northwest Service Command".[1]

The Alaska Highway Command as such was inactivated on 29 February 1944. This Command was provided first echelon medical service by the Medical Detachment of the 477th QM Regiment. With inactivation, the Medical Detachment returned to the United States.[1]

The Alaska Highway Command had started the construction of highway maintenance camps, at regular intervals along the whole of the Alaska Highway. The construction was at all stages of completion at the time of the curtailment order. Each camp had in its plan a dispensary. These dispensaries were abandoned. These dispensaries were located as follows: [1]

1. Fort St. John, B. C.
2. Blueberry, B. C.
3. Trutch, B. C.
4. Summit Lake, B. C.
5. Muncho Lake, B. C.
6. Coal River, B. C.

7. Watson Lake, Y. T.
8. Swift River, Y. T.
9. Teslin Lake, Y. T.
10. Canyon Creek, Y. T.
11. Destruction Bay, Y. T.
12. Koidern, Y. T.
13. Northway, Alaska
14. Cathedral Bluffs, Alaska
15. Big Delta, Alaska
16. Fairbanks, Alaska

Operating dispensaries closed in the course of the year 1944 were as follows:

1. U. S. Dispensary, APO 938, Unit 1, 10 beds inactivated, 11 February 1944.

2. U. S. Dispensary, APO 475, 10 beds, inactivated 11 February 1944.

3. U. S. Engineer Department (U.S.E.D.) Dispensary, Jesuit College, Edmonton, Alberta, 20 beds, closed 26 February 1944.

4. U.S.E.D. Dispensary, Dawson Creek, B.C., 24 beds, closed week of 10 March 1944.

5. U.S.E.D. Dispensary, Whitehorse, Y.T., 19 beds, closed week of 31 March 1944.

6. U.S.E.D. Dispensary, Prince Rupert, B. C., 14 beds, closed week of 26 May 1944.

7. U.S.E.D. Dispensary, McCrae (Whitehorse, Y.T.) 10 beds, closed week of 15 April 1944.

8. U.S.E.D. Dispensary, Skagway, Alaska, 20 beds, closed week of 3 March 1944.

9. U.S.E.D. Dispensary, Fairbanks, Alaska, 18 beds, closed week of 9 April 1944.

10. U.S.E.D. Dispensary, Johnson's Crossing, 23 beds, closed week of 1 September 1944.

11. U.S.E.D. Dispensary, Tok Junction, Alaska, 15 beds, closed week of 21 April 1944.

12. U.S.E.D. Dispensary, Kluane Lake, Y.T., 10 beds, closed week of 8 September 1944.

Operating "Examining Stations" closed were as follows:[1]

1. Los Angeles U.S.E.D. Examining Station for Northwest Service command, closed 18 March 1944.

2. San Francisco U.S.E.D. Examining Station for Northwest Service Command, closed 20 April 1944.

Hospitals closed were as follows:[1]

1. U. S. Army Station Hospital, Ft. Nelson (formerly known as Kerr General under Public Roads Administration) 50 bed normal capacity, disbanded 18 March 1944. Hospital minus equipment was abandoned.

2. U. S. Army Station Hospital, Skagway, Alaska, 150 bed normal capacity, inactivated 15 October 1944. Physical plant transferred to Department of Interior, Alaska, on 7 December 1944.

3. U. S. Army Station Hospital, Dawson Creek, B. C., 150 bed normal capacity, inactivated 25 October 1944. Physical plant was later transferred to Canadian authorities.

4. The Station Hospital, Chilkoot Barracks, Alaska, 25 beds, inactivated by War Department on 27 January 1943. This Command continued to use the Chilkoot Barracks Hospital as a dispensary until 1 June 1944 at which time it was closed.

The Northwest Service Command Medical Laboratory, Edmonton, Alberta, was disbanded 31 March 1944.[1]

In addition to the foregoing installations a considerable number of First Aid Stations were closed before the end of the year.[1]

It was impractical to issue overall sanitary regulations that would apply to all areas in the Northwest Service Command. Each area required special consideration, due to its location and distinctive problems. Prior to the curtailment of operations order in 1944 there were incidental area and district inspections by medical officers and

there were twelve sanitary officers devoting their whole time to sanitary matters within the Command area. It was felt that sanitary standards were high and that this was reflected in low sick rates and absence of epidemics, particularly those ascribed to sub-standard housing conditions, such as diarrhea and dysentery. Even settled communities in this area did not approximate our own standards until we gave them assistance. In some instances, this assistance curtailed intestinal diseases that were endemic in those communities for years.[4]

At the beginning of 1945 the Northwest Service Command continued to operate station hospitals at Whitehorse and Edmonton and had under its supervision, on a reimbursable basis, the White Pass Hospital of the WP&YRR at Skagway. There were also a 15 bed dispensary at Skagway and 10 bed dispensaries at Norman Wells and Canol.[1]

There were then roughly 100 stations in the Command at each of which were stationed a number of personnel varying from a half dozen to about 200. The groups in these stations varied from enlisted men on a "batching" status, to mixed military and civilians, the latter with families.[1]

Because it was not practical to employ a first aid attendant as such, for each station, this command organized a First Aid School on 1 December 1944. The school was located in Whitehorse and was under the immediate jurisdiction of the Surgeon's Office. Classes were of one-weeks duration. The size of the class, depending on current status of transportation, varied from 20-30. Students were both military and civilians, in the ratio of 10 military to 20 civilians. Students were selected by operating units, and successful graduates placed at strategic locations under the supervision of Area Surgeons. All students were further screened on the 1st day of the School term by the AGC test. All those students falling in Class IV and V of the above test were disqualified and returned to proper stations. Successful graduates were given an American Red Cross First Aid Certificate. The first aid duties of all graduates were in addition to the job for which they were employed. No added remuneration was allowed. The whole idea was based on that necessary principle of self-sufficiency forced upon all personnel who are isolated from modern transportation, communications and outside services.[1]

The authorized bed capacity of the Whitehorse Station Hospital was reduced from 200 beds to 150 beds on 12 June 1944; from 150 beds to 100 beds on 12 April 1945; from 100 beds to 50 beds on 20 May 1945. It remained a 50 bed Station Hospital until taken over by the Canadian Army on 1 April 1946.[2]

The authorized bed capacity of the Edmonton Station Hospital was reduced from 250 beds to 212 beds in September 1944; from 212 beds to 150 beds in December 1944; from 150 beds to 100 beds on 21 May 1945; from 100 beds to 50 beds on 1 November 1945. It was reduced to dispensary status on 1 April 1946.[2]

The dispensary at Canol Camp was inactivated on 17 March 1945. The dispensary at Norman Wells was inactivated on 17 April 1945. The White Pass Hospital Service was consolidated with the Skagway dispensary on 28 February 1945. The latter was closed in June 1945.[2]

Effective 2400 hours 30 June 1945 the Northwest Service Command was inactivated and became the Northwest District of the Sixth Service Command. The mission was restated under the provisions of War Department General Orders No. 50, dated 28 June 1945.[4]

The Medical Department Service Units at Whitehorse and Edmonton were redesignated under General Order No. 1, Northwest District, Sixth Service Command, dated 1 July 1945. There was no substantial change in the basic medical services. The Service Command Surgeon's Office was, of course, replaced by a District Office with headquarters at the Edmonton Station Hospital. Veterinary and sanitary inspection services were transferred to the District Surgeon's Office and such operations were continued as under the Northwest Service Command. On 1 April 1946 the veterinary and sanitary services were consolidated under one veterinary officer.[4]

NORTHWEST SERVICE COMMAND MEDICAL LABORATORY
Office of the Commanding Officer
APO 722, Group F, c/o Postmaster
Seattle, Washington

HEW/ts

12 November 1943

SUBJECT: Functions of the Northwest Service Command Medical Laboratory.

TO: All Medical Officers, Medical Installations, all Posts and Stations, Northwest Service Command, including Air Corps Installations, United States Engineer Division, and Exempted Stations.

1. General.--Under the provisions of letter WD AGO 322.39 (10-30-40) M (Ret) M, Subject: "Establishment of Corps Area and Department Laboratories," dated January 15, 1941, letter WD SGO, Subject, "The Development of Corps Area and Department Laboratories," dated August 15, 1941, and AR 40-305, Subject: "Service Command and Department Laboratories," dated November 14, 1942, the Northwest Service Command Laboratory is activated at Edmonton, Alberta, Canada. This laboratory is being established for the purpose of assisting in the control and prevention of epidemic and endemic diseases, and to supervise, standardize, and supplement the laboratory diagnostic services of Station Hospital Laboratories.

2. Functions.

a. The functions of a Service Command Laboratory are similar to those of a State Public Health Laboratory and are outlined in AR 40-305, and in letter SGO, dated August 15, 1941, Subject, "The Development of Corps Area and Department Laboratories," as follows:

(1) Epidemiological Investigations.

(2) Sanitary Laboratory Control.

(3) Supplementary Diagnostic Service.

(4) Aid to laboratory services in Station Hospitals and Dispensaries.

b. The Northwest Service Command Laboratory is so staffed and equipped to serve as a central control laboratory for this Service Command, and as a reserve to augment facilities in case of epidemics or emergencies.

Request for consultation, questions relative to technical problems and all specimens for confirmation studies will be referred to this laboratory. When indicated, the specimens will be forwarded from this laboratory to the Army Medical School for further confirmation.

c. In view of the fact that Service Command Laboratories are provided primarily for the prevention of disease, this function must not be hampered by the performance of routine diagnostic work which normally should be performed by the laboratories of General and Station Hospitals. Even though a Service Command Laboratory is located in the vicinity of a hospital, the latter should be provided with its own independent laboratory service. (See SGO Circular No. 73, 1941, Subject: "The Provision of Adequate Laboratory Services in Military Hospitals.) When local facilities are not available routine laboratory procedures will be performed by the Service Command Laboratory in the best interest of the Service.

3. Personnel.--The personnel of the Service Command Laboratory has been carefully selected to insure the services of individuals highly trained and specialized in public health and preventive medicine.

4. Laboratory Service of the Northwest Service Command Laboratory.-- In order that all concerned may be thoroughly familiar with the facilities available, the nature of the services are outlined as follows:

a. Epidemiological Investigations.--The laboratory is adequately staffed and equipped to conduct extensive investigations of unusual disease conditions and to collect and examine specimens required for the study, prevention, and control of communicable diseases. These services may be utilized as follows:

(1) Surveys and special studies will be conducted by the staff of this laboratory in the event any disease tends to exceed endemic proportions.

(2) In the event of an outbreak of food poisoning, dysentery, or other epidemic disease, specimens of food and cultures, should be mailed to the Service Command Laboratory in addition to studies conducted locally. In the event local facilities are inadequate mobile units will be made available.

(3) Information will be supplied upon request concerning trends in infectious diseases from statistical records maintained at this laboratory on military and civilian populations.

5. Laboratory Control Program.--Facilities are available for the examinations required for the operation and maintenance of water and milk supplies, sewage disposal plants, and for the examination of food stuffs to determine their bacteriological and chemical safety. In order to maintain military sanitation in this Service Command in a state of effectiveness, the Commanding Officer of the Northwest Service Command Laboratory, in cooperation with the chief of the Medical Branch, will institute such circular letters as are necessary to institute the following laboratory control program:

a. Examination of Milk and Dairy Products:

(1) Specimens of formolized milk, cream, and ice cream may be sent as often as necessary to the Northwest Service Command Laboratory from each contracted supply for the purpose of establishing a check on pasteurization by means of the phosphatase test, direct bacteria counts, and such other examinations as indicated.

(2) If local facilities are not available for examination as described above, specimens will be submitted weekly.

(3) Specimens of milk, cream, cheese and food products may be submitted at any time for analysis of butter fat and other special examinations.

b. Examination of Water.

(1) Samples of water should be submitted to the Northwest Service Command Laboratory once each month from all water supplies used by troops in this Service Command for the purpose of confirming the results of local examinations.

(2) If local facilities are not available for bacteriological examinations of water samples should be submitted weekly to the Northwest Service Command Laboratory.

(3) When a non-potable specimen is found, samples will be submitted to the Northwest Service Command Laboratory daily for five days or until potability is re-established.

(4) All samples of water submitted must be collected by an officer, and residual chlorine content determined at time sample is collected; certification to these effects will be made on blank form accompanying sample. Further directions covering the laboratory control of milk and water supplies in the Northwest Service Command will be issued as required by the Northwest Service Command Laboratory.

c. Control of Insect and Tick-Borne Diseases.

(1) Due to the incidence of malaria transmitting mosquitoes in certain areas of this Service Command, thick and thin blood films will be submitted to the Northwest Service Command Laboratory from every case of malaria, positive or doubtful, and from all cases with malaria history admitted to hospitals from outside this Service Command.

(2) Specimens of adult mosquitoes and larvae will be sent to this laboratory at weekly intervals during the mosquito season for confirmation of type and determination of prevalence of mosquitoes at various stations.

(3) Rocky Mountain Spotted Fever, Tularemia, Relapsing Fever, and other tick-borne diseases are endemic in many areas of Canada, therefore, every effort will be made to collect specimens of ticks for submission to this laboratory for identification and study.

(4) The services of the laboratory staff will be available to Station Surgeons in planning mosquito control programs and in instituting other pest control measures, flies, bed bugs, cockroaches, etc.

d. Mess Sanitation.

(1) Due to the dangers of disease transmission through eating utensils, dishes will be cultured in all Army Messes at least each month where facilities are available and report submitted to the Northwest Service Command Laboratory for transmission to the Chief of the Medical Branch.

(2) Statistical data will be compiled from these reports and recommendations made for raising the standards of cleanliness in Army Messes.

e. Food Poisoning Control.

(1) In order that etiologic agents may be determined in food poisoning outbreaks and control measures recommended, it is desired that the Northwest Service Command Laboratory be called in consultation in all such episodes.

(2) Bacteriological studies should be made locally where facilities are available, but all implicated foods should be divided and a portion sent to the Service Command Laboratory for bacteriological study. History of the outbreak should accompany the specimens.

(3) Specimens of vomitus and stools should be sent when vomiting and diarrhea is a predominant symptom of involved individuals. Stools from food handlers should be submitted in all outbreaks of diarrhea.

(4) All above specimens should be submitted in sterile containers. Corresponding intact or non-opened specimens should also be submitted if possible.

f. Diagnostic Services.--The Northwest Service Command Laboratory will perform diagnostic tests and examinations that cannot be done at the local station hospital laboratories. It is desired that Surgeons and laboratory officers call upon this laboratory at any time for confirmation studies and for assistance in the solution of technical problems that may arise. Directions for shipment of specimens and specimen containers will be supplied by this laboratory.

(1) Bacteriology.

(a) This laboratory will be prepared to assist in the identification and confirmation of unknown organisms. All suspected pathogenic bacteria that cannot be identified locally will be sent in, and all pathogens, spinal fluid, blood cultures, and stools will be sent in for confirmation.

(b) Due to the presence of enteric infections among the civilian population in this Service Command, stools from all cases of diarrhea should be cultured and studied for parasites; all suspected and positives will be sent to the Service Command Laboratory.

(c) Routine bacteriological and parasitological procedures will be carried out on all stool specimens submitted from station hospitals where facilities are not available.

(d) Bacteriological surveys will be conducted when indicated and consultation services will be available for the investigation of etiologic agents in epidemic disease. Members of the staff of this laboratory will be sent to any station in this Service Command for the study of unusual problems.

(e) Supplies of culture media will be furnished from this laboratory when needed for special studies.

(2) Parasitology.

(a) The examination of stools for parasites is one of the most difficult and technical procedures in the laboratory, therefore, specimens from all cases of suspected enteric parasitism should be submitted to this laboratory as well as from all cases of diarrhea.

(b) Stool specimens from all patients admitted from overseas areas should be submitted to this laboratory if there is any history of probable parasitic infestation, or previous history of diarrhea.

(3) Chemistry.

(a) Bio-chemistry--facilities will be available for standard chemical colorimetric and titrimetric determination on whole blood, blood filtrates, blood serum, spinal fluid, and urine, from stations not equipped to perform these tests.

(b) Water Chemistry--specimens will be submitted for chemical analysis from all water supplies used by military personnel in this Service Command.

(c) Industrial Chemistry--a consultation service will be available on problems of industrial chemistry.

(d) Toxicology--facilities will be available in this laboratory for complete toxicological examinations. When specimens are submitted a complete protocol and other pertinent information should always be sent with the sample to avoid needless delay in making the examinations. Ample specimens should always be submitted.

(4) Serology.

(a) This laboratory will maintain a confirmation service for checking doubtful and positive serological tests for the diagnosis of syphilis. Both the Kahn and complement fixation tests will be performed. Routine tests will be performed for those station hospitals where facilities are not available.

(b) Chemical and serological examinations of spinal fluid will be performed on request.

(c) Facilities will be available for performing other types of serological examinations, such as routine agglutination tests, heterophile antibody reactions, etc. When blood or serum is submitted for serologic diagnosis of infectious mononucleosis it is desired that two unstained thin blood films be submitted at the same time.

(d) Specimens of chancre fluid may be submitted in capillary pipettes furnished by this laboratory, for dark field examination.

(5) Veterinary Examinations.

(a) Specimens may be sent to this laboratory for rabies examinations. Samples of brain tissue, entire brain if possible, should be shipped in ice; if this is not possible it should be divided, one half placed in ten per cent formalin, the other half in glycerine.

(b) Blood serum may be submitted from animals for the diagnosis of Bang's diseases.

(c) Cultures or specimens from lesions of other animal diseases should be submitted to this laboratory.

(d) Examinations of milk and milk products.

(6) Hematology.--Unstained blood smears from cases that present difficult diagnostic problems should be submitted to this laboratory for study. A brief case history should accompany these specimens.

g. Improvement of laboratory services in Station Hospital Laboratories and Dispensaries. The Northwest Service Command Laboratory will be prepared to assist in maintaining a high standard of diagnostic accuracy in laboratories throughout the Service Command. To accomplish this purpose the following program is instituted:

(1) Supervision and inspection of Station Hospital Laboratories.--The staff of this laboratory will be prepared to assist in the supervision and inspection of diagnostic facilities of all laboratories in this Service Command--officers in charge of Station Hospital or Dispensary Laboratories are authorized to communicate directly with The Commanding Officer, Northwest Service Command Laboratory, regarding technical problems in Laboratory diagnosis.

(2) Evaluation studies.--In order to assist in the standardization of laboratory procedures unknown organisms and sera will be sent from time to time to the various station hospital laboratories for examination--(Circular letter 37, SGO, April 23, 1942.)

(3) Training courses for laboratory workers.--Short refersher courses will be organized for laboratory personnel in this Service Command covering all phases of public health laboratory procedures. These courses will be conducted at the Northwest Service Command Laboratory and, in general, will cover a period of approximately two weeks. Announcements concerning the conduct of these courses will be made at a later date.

(4) Preparation and submission of monthly laboratory reports.

(a) A monthly laboratory report will be submitted to the Northwest Service Command Laboratory from all Station Hospitals and Dispensary Laboratories. These reports will permit an evaluation of the scope of work performed and provide valuable epidemiological data. Copy of model report form is attached.

(5) Communicable Disease Reports.--A copy of report of all communicable diseases reported to military and/or civilian public health authorities will be sent to the Northwest Service Command Laboratory in order that graphs, charts, maps, etc., may be maintained to indicate trends in communicable disease so that necessary laboratory control methods may be instituted.

h. Pathology.--This laboratory has been designated as the histopathologic center for this Service Command, and will maintain a complete gross and microscopic tissue service. In order that this service may be effective and rapid it is requested that the provisions of Circular letter No. 141, SGO, 29 July 1943, AR 40-310 and 410, and "The Army Autopsy and Histopathologic Service", be carefully followed in the submission of specimens.

i. Under the provisions of Paragraph 9, AR 40-305, direct correspondence on technical subjects is authorized between the Commanding Officer, Service Command Laboratory, and Medical Department Officers. Upon receipt of this letter all officers concerned should communicate with the Commanding Officer, Northwest Service Command Medical Laboratory, APO 722, Group F, outlining their problems and needs. Request for instructions regarding collection and shipping of specimens, as well as containers therefor, should be directed to the Service Command Laboratory.

/s/ H. E. Wright,
HARRY E. WRIGHT,
Lieut. Colonel, Medical Corps,
Commanding.

A true copy

J. G. Manning
Captain, Sanitary Corps

CHAPTER 4

The Physical Selection of Military and Civilian Personnel

Presumably all military personnel were physically qualified for overseas duty, in accordance with existing Army Regulations and War Department Circulars, prior to departure from the United States. Combat Engineer units and auxiliary units moved into the Command as early as March 1942. By May 1942, over 2500 engineer troops had passed thru Edmonton alone, for duty on the Alaska Military Highway and Canol projects.[3] In 1943 the increased incidence of gastro-intestinal diseases was attributed to the fact that new units moving into the Command had a good portion of older age groups and a number of limited service men. These men had been reclassified by draft boards and many had physical defects that existed prior to induction.[1]

The opinion of medical officers was that the physical selection of military personnel arriving here in the 1942-1943 period left something to be desired. Many men, particularly those in the 35 years or older group, were unable to withstand the hardships of field soldiering in the cold climate with such a rugged mission. Subsequent to 1943, type and caliber of the soldier assigned to this Command were much improved; the men were younger and better trained; the indication was that more effective screening was being accomplished in the United States.[3]

A peak strength of some 20,000 troops was shown for this Command in the middle of 1943. As civilians replaced military personnel on many projects a combined peak, including contractor personnel, of 26,260 was reached in February 1944. Curtailment of operations began to have a marked effect on combined strength when the monthly strength for August 1944 showed a drop of approximately 7,000, almost all civilian. By July 1945, after inactivation of the Service Command, the Northwest District carried 780 civilian and 1310 military personnel.[1]

In general the health of the Command was good, non-effective rates were low. There have been no instances where the incidence of any particular disease has reached epidemic or endemic proportions, nor has there been any incidence of large numbers of cases requiring medical attention wherein the etiological factor was something that could have been avoided. Causes of illness could not definitely be attributed to the climate or geographical conditions. Even in Skagway, where work on the docks and railroad, was most hazardous, with wet and cold weather and winds that sometimes reached a velocity of 60 miles per hour, the incidence of disease and injury was surprisingly low. There were no epidemics of communicable disease other than the occasional flare-up of upper-respiratory infections. There were no unusual pathologies among personnel.[1]

Medical records of the command show a predominate proportion of civilian over military patients, this proportion at times reaching a ratio of four to one. Most civilians were in draft exempt status because of age or physical defect. It is understandable that civilian physical standards were lower. There were decided changes in case types. Conditions unusual to Army practice, such as coronary heart disease, peptic ulcer, and malignancies were more common. Also, the large number of female civilian employees brought about a number of conditions peculiar to the sex. Conversely enough, such factors had a favorable influence on the medical officer, who had the opportunity to treat a larger variety of pathological conditions than would be normal to Army practice.[1]

Some civilians were working on projects in the Northwest Division prior to the establishment of the U. S. Engineer Department Health Service in this area. These employees were given the equivalent of pre-employment physical examinations in March 1943. Reference is made to Northwest Division Circular No. 39, 27 February 1943, subject "Physical Examinations and Immunizations" attached hereto.[4]

The physical selection of contractors' employees, location of examining offices in the United States, causes for rejection of applicants for employment and other pertinent data on physical requirements and procedures for qualification are contained in attached Northwest Division Circular Letter No. 23 (Revised), subject "Physical Examination and Immunization of Contractors' Employees", dated 18 February 1943.[4]

The Northwest Division placed limited service restrictions on contractor personnel found physically defective in the course of their employment on the project as indicated in the following excerpt from the Division Medical Officer's instructions in 1943 to first aid personnel.

"FIRST AID PERSONNEL INSTRUCTIONS" 1943

1. When the District Medical Officer recommends a Medical Transfer, this will mean that the employee is to be transferred to another area where suitable supervised medical service is available.

   In the case of a MEDICAL TRANSFER, it will be necessary for you to request the local Bechtel-Price-Callahan Administration Manager or Area Superintendent to compile and submit to the Edmonton Office, Legal Department (Medical Section) all regular transfer papers to accompany the

employee. These must include transfer slips, travel statement, and medical statement. The Medical Statement must reach the Edmonton Office prior to or with the employee on his arrival.

Any sick time paid at job site must be recorded in the information forwarded.

2. When the District Medical Officer recommends a MEDICAL RESTRICTION, this will mean that an employee's working ability is restricted to certain pre-determined tasks and/or specified areas.

3. When the District Medical Officer issues a CONDITIONAL MEDICAL DISCHARGE, this will mean that a man is being temporarily discharged in order to enable him to seek private medical care to correct some condition which is not a direct result of his employment with Bechtel-Price-Callahan. In the event of a CONDITIONAL MEDICAL DISCHARGE, a man may be rehired when the indicated condition has been corrected. When a CONDITIONAL MEDICAL DISCHARGE is recommended by the District Medical Officer, it will be necessary for you to request the local Bechtel-Price-Callahan Administration Manager or Area Superintendent to compile and submit to the Edmonton Office the same forms which apply under Section 1 above.

4. When the District Medical Officer authorizes a FULL MEDICAL DISCHARGE, this will mean that a man's physical condition precludes any possibility of his further being employed on northern projects. In this case, it will be necessary for you to request the local Bechtel-Price-Callahan Administration Manager or Area Superintendent to compile all of the same papers and reports listed in Section 1 above, which will be transmitted in the same manner.[4]

Northwest Division Circular Letter No. 108, dated 12 November 1943, stated:

> "In addition to existing instructions, all employees departing for the United States on official leave of absence are required to take exit physical examination on leaving the job site and to take an entrance physical examination before returning to the job-site."[4]

The U. S. Civil Service Commission (Form 2413, March 1940) Certificate of Medical Examination covered U. S. Civilians in civil service status. The Service Command Surgeon required that blood pressure qualifications be applicable in all cases.[4]

On 1 March 1945 the Surgeon of the Northwest Service Command published the attached list of physical conditions as cause for rejection entitled "Physical Conditions that are Causes for Rejection of Applicants for Employment in the Northwest Service Command." [4]

Medical standards for White Pass and Yukon Railroad employees were indicated in a memorandum from the Service Command Surgeon to the Chief of Staff, Northwest Service Command, dated 17 November 1944 which stated "Physical requirements for White Pass and Yukon Railroad employees are the same as required for any other civilian employee. Waivers for physical defects are authorized only by this office. Prior to granting waiver due consideration is given to age, general physical condition, degree of disqualifying defect, the hazard offered by same, work employee is to perform, and the availability of suitable personnel for type of duty called for."[4]

In addition to the above medical examinations were required prior to return to the United States of all military and civilian personnel as indicated in Northwest Service Command Circular Letter No. 80, this subject, dated 1 May 1944, a copy of which is attached.[4]

The annual report of the Edmonton Station Hospital for 1944 indicated that problems met with civilian applicants for employment, covering defects which are frankly disqualifying, have rendered these examinations difficult. In order to make a more searching study, urinalysis and blood serology has been added as a routine. It is believed that this additional procedure will pick up a certain number of individuals who otherwise would have been accepted; such as cases of the gonorrhea, disease of the genito-urinary tract, and syphilis and diabetes.[1]

The annual report of the Haines Area, Chilkoot Barracks for 1944 indicated that all contractors' personnel entering the Haines area were examined by the Area Medical Officer or his assistant. Although these persons received a physical examination at the point of hire, they were rechecked for the purpose of ascertaining whether or not they may have acquired any acute communicable diseases enroute, or if there was any anatomical condition which should be checked or which may have been overlooked on the previous physical examination. This routine of examining all patients who entered the Area was well worth the effort,

because in each shipment of men, approximately one to five percent showed difficulties for which the patient later was either treated or may have claimed was due to job-incurred injury. There were no communicable diseases recognizable as such, however, in two instances patients were examined and found to have a dermatitis and although there was no history suggestive of venereal disease, in both instances the routine Wasserman disclosed serological evidence of syphilis. On the other hand, when patients completed their period of service with the contractor, they were checked through the office of the Area Medical Officer. Their pre-employment physical records were examined and their hospital records were checked. They were also questioned as to whether or not they had any injuries or illnesses which they were complaining of at the moment, and then they were given a physical inspection and examination.[1]

WAR DEPARTMENT
Office of The Division Engineer
Northwest Division
Edmonton, Alberta, Canada

NWDM I

DIVISION CIRCULAR LETTER NO. 39 February 27, 1943.

SUBJECT: Department Health Service

TO: District Engineers, Area Engineers, Contractors, and All Concerned.

1. GENERAL

a. The Northwest Division Engineer Health Service, staffed by Medical Department officers of the United States Army, will be responsible for the rendering of a complete health service to all persons employed in the performance of work under the administration of the Division Engineer, Northwest Division.

b. The Engineer Health Service will utilize existing military facilities, both Canadian and American, and also existing local civilian clinics and hospitals when necessary and available. In addition to the above facilities, the Engineer Health Service will place such dispensaries and aid stations where and when needed.

c. A Medical Corps officer of the United States Army will be assigned to the staff of each District Engineer. Such officer will be the District Medical Officer and will be responsible for the establishment and maintenance of health service in this district, under the administrative supervision of the District Engineer. Junior Medical Officers will be assigned to each district as deemed necessary by the District Engineer.

d. The utmost cooperation will be maintained among all United States Government Agencies, both military and civilian, in the accompliahment of the medical plan of the Northwest Division Engineer Health Service.

2. MEDICAL CARE:

a. All employees who are citizens of the United States and who are working outside the Continental Limits of the United States will be entitled to required medical care free of all costs for all injuries and illnesses not due to their own misconduct.

b. All employees other than United States nationals will be entitled to required medical care free of all costs for all compensable illnesses and injuries.

c. Dependents of United States nationals will be furnished medical care insofar as facilities are available, at cost plus 20 per cent. Such care will be at the discretion of the District Engineer.

d. Treatment of noncompensable injuries and illnesses may be given employees not citizens of the United States, who are quartered and subsisted by the U.S. Engineer Department or their contractors at cost plus 20 per cent.

e. Necessary treatment will be given all cases, military or civilian at all times.

3. PROCEDURE IN COMPENSABLE CASES:

a. U.S. Engineer Department Employees:

The U.S.E.D. Personnel Section will be responsible for the proper execution of all U.S.E.C.C. forms. Civilian employees compensable by the United States Employee's Compensation Commission (both U.S. Nationals and Canadians) must have the required U.S.E.C.C. compensation forms of the CA series executed. Either form CA 16 or CA 17 is necessary when an employee is treated by the United States Government of civilian agencies other than U.S.E.D. Health Service. U.S.E.C.C. Form CA 1 must be executed at the time of the injury. U.S.E.C.C. Form CA 2 will be initiated by the immediate superior of the injured employee and completed by the Medical Officer treating the case. Upon completion, these forms will be submitted to the U.S.E.D. Personnel Section for proper disposition.

b. Contractor's Employees:

(1) All employees, regardless of the nationality of the contractor, engaged in work in the Yukon, Northwest Territories and Alaskan are subject to Longshoreman's Act as amended by the P.L. 208, 77th Congress.

(2) All U.S. Nationals and Canadian Nationals employed by U.S. contractors in Alberta and engaged in work in Alberta are subject to the compensation laws of Alberta.

(3) All employees of Canadian Contractors, regardless of the nationality of the employees, engagaged in work in B.C. are subject to the compensation laws of B.C.

(4) All employees of U.S. contractors engaged in work in B.C., regardless of their nationality, are subject to the Longshoreman's Act as amended by P.L. 208, 77th Congress.

4. MEDICAL ACCOUNTS WITH LOCAL PHYSICIANS, LOCAL HOSPITALS AND OTHER GOVERNMENT AGENCIES:

a. All accounts previous to the inception and operation of the Northwest Division Engineer Health Service must be approved for payment of reimbursement by an authorized representative of the Division Engineer, preferably by an Engineer Health Service Medical Officer.

b. No medical expenses voluntarily incurred, subsequent to the establishment of the Northwest Division Engineer Health Service, by employees of the U.S.E.D., the various contractors, subcontractors and/or their authorized representatives, will be approved without prior authorization to the District Medical Officer acting in the name of the District Engineer.

c. It is to be stressed that all existing medical facilities will be utilized and it will be the responsibility of the District Medical Officer acting for the District Engineer to approve such facilities.

5. SICK LEAVE AND ANNUAL LEAVE FOR MEDICAL REASONS:

a. It will be necessary for all employees to report all illnesses to the nearest aid station or dispensary immediately.

b. No sick leave will be granted unless the above is complied with and no reimbursement will be made contractors for such necessary wages or salary paid an employee who does not report his illness or injury immediately.

c. Individual contracts with the employee will be the basis for the consideration of payment of wages and salaries for sick and annual leave.

6. PHYSICAL EXAMINATIONS AND IMMUNIZATIONS:

a. As directed in Division Circular #23 (revised) Subject: "Physical Examinations and Immunications - - - -"it will be necessary for all contractor's employees to successfully pass a pre-employment examination, and obtain the required inoculations before entering the Northwest Division.

b. Those employees working on projects in the Northwest Division previous to the establishment of the Northwest Division Engineer Health Service will be given a complete examination as directed by the District Medical Officer and receive the required immunizations as a requisite for the continuation of their employment. It is anticipated that these examinations will be given during the month of March 1943.

c. All U.S.E.D. employees will be given an examination and receive the required immunizations. The U.S.E.D. Personnel Section will be advised of the date when this service will start.

d. In general, it will not be required of prospective employees to have an urinalysis of serological examination. These will be done only at the discretion of the U.S.E.D. Medical Examining Officer in the United States.

e. The following medical examining offices are now in operation in the United States:

(1) Medical Examining Office, 307 to 309 - 1331 Third avenue, Seattle, Washington.

(2) Medical Examining Office, 201 Pere-Parquette Bldg., Minneapolis, Minnesota.

(3) Medical Examining Office, 729 South Figuero Street, Los Angeles, California.

(4) Medical Examining Office, 270 Broadway, New York, New York.

Please note this circular includes the address of the Seattle Office which was not included in the Division Circular No. 23, mentioned in 6 a above.

7. This circular will be revised and supplemented when necessary.

For the Division Engineer:

/s/ H. J. Woodbury
H. J. WOODBURY
Colonel, Corps of Engineer

230/225 (NWD) 1

WAR DEPARTMENT
OFFICE OF THE DIVISION ENGINEER
Northwest Division NWDM- 1
EDMONTON, ALBERTA, CANADA

February 18, 1943.

DIVISION CIRCULAR LETTER NO. 23 (Revised)

SUBJECT: Physical Examination and Immunization of Contractors' Employees.

TO: District Engineers, Area Engineers, Contractors and others concerned.

1. Division Circular Letter No. 23 dated February 11, 1943, Subject: "United States Engineer Department Health Service" is hereby revised.

2. General: Effective as of March 1, 1943, physical examination of contractors' employee will be in accordance with the following instructions:

3. Personnel to be examined:

a. Every person who is to become a new employee of the contractor and whose salary is to be reimbursed to the contractor by the Government shall be required, before becoming an employee of the contractor, to take a physical examination as outlined on Form MD 1 NWD and MD 2 NWD, and no person shall be employed until he has successfully passed such an examination and the Form MD 1 NWD and MD 2 NWD has been approved by the Medical Section, Northwest Division.

b. Every person in the employ of the Contractor previous to the effective date of this circular letter whose salary is a reimbursable item shall also be required to be examined and shall successfully pass such an examination as a requisite to the continuation of his employment.

c. All individuals engaged for work in Contractors' offices in the United States either on a temporary or permanent basis whose duties subsequently require them to travel to points in the Northwest Division project should receive and pass the prescribed medical examination.

4. Types of physical examinations: Two types of physical examinations are given, the "preliminary" type and the "final" type.

a. The "preliminary" examination is performed by civilian physician at points more than 25 miles distance from any United States Engineer Department Medical Examining Office. The purpose is that of a screen examination. Before an individual is permitted to travel to a United States Engineer Department Medical Examining Office his "preliminary" examination record must be approved by a United States Engineer Department medical officer. Contractors will be furnished with a list of physicians designated to give "preliminary" type examinations. Other physicians are not to be used except in cases of extreme emergency where the physicians listed are not available.

b. The "final" type examination is given only by medical officers of United States Engineer Department, and such an examination is required before any individual can be permitted to travel to the Northwest Division project.

c. If the employee does not leave for the project within 60 days after being medically qualified, the qualification becomes void and it is the responsibility of the contractor to renew this qualification by securing medical re-examination.

5. Waivers on physical requirements: No waivers in the physical requirements shall be made except in cases of unusually qualified "key men" and then only upon recommendation of a member of the medical staff of the Division following a physical examination of the applicant by an examining medical officer. Such waivers as may be granted shall be in writing and signed by the Division Engineer or his authorized representative. Office employees to be used exclusively within the continental limits of the United States will be examined for record only and will not be disqualified for medical reasons.

6. Persons authorized to give examinations:

a. Only medical officers of the United States Engineer Department are authorized to give the "final" type physical examination.

b. The "Preliminary" type physical examination may be given by any physician designated by the Division Engineer or his authorized representative.

7. Place of examination:

a. "Final" type physical examination may be secured between the hours 9 A.M. and 11 A.M. and 1 P.M. and 3 P.M. from Monday through Friday at the following offices:

(1) Medical Examining Office, Seattle, Washington (address to be furnished later).

(2) Medical Examining Office, 201 Pere-Marquette Bldg., Minneapolis, Minnesota.

(3) Medical Examining Office, 729 South Figuero Street, Los Angeles, California.

(4) Medical Examining Office, 270 Broadway, New York, New York.

b. All persons referred to the medical offices by a contractor shall bear a note or letter stating name of contractor, name of person to be examined, type of employment and destination (United States or Northwest Division project). Persons who do not possess such credentials will not be given such examination. Employees living within a 25 mile radius of United States Engineer Department Medical Examining Offices will be given only a "final" type examination.

c. Prospective contractor employees living outside the area heretofore described in paragraph 6b shall be given the prescribed examination at their home station by a person authorized as per paragraph 5b heretofore and as arranged by the contractor.

8. Execution of Physical Examination Form MD 1 NWD and MD 2 NWD:

a. "Preliminary" type physical examinations.

(1) Forms MD 1 NWD and MD 2 NWD shall be furnished the examining physician by the contractor. The physician shall send the form to the contractor and the contractor shall immediately make and transmit five copies (including the original) to the nearest United States Engineer Department Medical Examining Office for a tentative approval. Transportation of the applicant to the nearest United States Engineer Department Medical Examining Office will not be authorized until approval is granted in writing by the Division Engineer or his authorized representative.

b. "Final" type physical examinations. When authorized transportation to the nearest United States Engineer Department Examining Office has been secured by the applicant, the contractor shall refer the applicant, bearing a written request to the nearest United States Engineer Department Medical Examining Office for the "final" type examination.

9. Authorization for travel to the Northwest Division project: Authorization for travel to the Northwest Division project will be in writing over the signature of the Division Engineer or his authorized representative, and only after physical examination clearance has been obtained from the United States Engineer Department Medical Examining Office. It is to be noted that clearance from the Medical Examining Office does not in itself constitute authorization for transportation of the employee.

10. Payment for physical examination:

a. In the event the examination is given by a medical officer of the United States Government, either civilian, military, or naval, no payment for such examination shall be made. All other examining physicians shall bill the contractor for whom the examination was made. The contractor shall make payment for the services rendered, and will be reimbursed by the Government as provided in his contract.

b. The contractor shall not be reimbursed more than $2.00 for the physical examination of an applicant.

11. Causes for rejection:

No person shall be employed who has an infectious or contagious disease.

No person shall be employed whose physical condition is such that employment on any project in the district may prove harmful to his health and well-being or the health and well-being of another employee.

No person shall be employed who is subject to epilepsy.

No person shall be employed who has marked varicosities.

No person shall be employed who has lost the use of an arm, hand, foot or leg.

No person shall be employed who has a hernia.

No person shall be employed who, in the opinion of the examining physician, has a disabling hydrocele.

No person shall be employed who has a acute venereal disease.

No person shall be employed who has organic heart disease.

No person shall be employed who has a chronic respiratory condition.

No person shall be employed who has a diastolic blood pressure of 100 with the systolic pressure being appropriate for the age of the applicant.

No person shall be employed who cannot read newsprint without eye glasses with a distant vision rating of 20/200 with each eye unless such vision is corrected with glasses to 20-40 for distant vision and ability to read newsprint with one eye.

No person shall be employed who cannot hear a normal conversation voice at 20 feet.

No person shall be employed who does not have at least one molar occlusion on each side.

12. Immunizations: Certain immunizing procedures are required as part of the "final" type physical examinations. These will be given only at United States Engineer Department Medical Examining Offices.

For the Division Engineer:

/s/ H. J. Woodbury,
H. J. WOODBURY,
Colonel, Corps of Engineers.

2 Incls:
MD 1 NWD
MD 2 NWD

WAR DEPARTMENT
Office of the Division Engineer
Northwest Division
Edmonton, Alberta, Canada

NWDM-1

February 23, 1943

DIVISION CIRCULAR LETTER NO. 23 (REVISED)
(SUPPLEMENT NO. 1)

SUBJECT: Physical Examination and Immunization of Contractors' Employees.

TO: District Engineers, Area Engineers, Contractors and others concerned.

1. Reference is made to Division Circular Letter No. 23 (Revised) dated February 18, 1943, paragraph 7, a, (1).

(a) Address of Medical Examining Office, Seattle, Washington, is 1331 Third Avenue, Room Nos. 307-309.

For the Division Engineer:

/s/ H. J. WOODBURY
Colonel, Corps of Engineers

WAR DEPARTMENT
Office of the Division Engineer
Northwest Division
Edmonton, Alberta, Canada

NWDM-1

March 6, 1943.

DIVISION CIRCULAR LETTER NO. 23 (Revised)
SUPPLEMENT NO. 2

SUBJECT: Engineer Department Health Service; Amendment to Division Circular Letter No. 23 (revised), dated February 18, 1943.

TO: District Engineers, Area Engineers, Contractors and Others Concerned.

1. Division Circular Letter referred to above is amended by deleting paragraph 2 thereof and substituting the following:

"2. General: Effective as of April 1, 1943, physical examination of Contractors' Employee will be in accordance with the following instructions:"

For the Division Engineer:

/s/ H. J. Woodbury
H. J. WOODBURY
Colonel, Corps of Engineers

Normal office distribution,
50 - Each district and contractor,
120 - Edmonton District.

1. Height: Without boots or shoes
   Weight: With normal clothing, without coat or hat.
2. Medical History: Be sure and enter history of mental episodes. add sheet if more space is required.
3. Vision: No person shall be employed who cannot read newsprint without eye glasses with a distant vision rate of 20/200 with each eye glasses with a distant vision is corrected with glasses to 20/40 for distant vision and ability to read newsprint with one eye.
4. Ears: Required to hear normal conversational voice at 20 feet, Any disease of the ears to be noted.
5. Heart: Murmurs. State whether functional or organic. If valvular disease exists, state whether or not it is fully compensated.
6. Respiratory: Condition of lungs.
7. Abdominal viscera: Scars of serious operations.
8. Hernia: of any type is cause for rejection. Truss is not satisfactory.
9. Venereal Disease: Any evidences of active disease.
10. Bones, joints and muscles:
    Extremities: Deformities, amputations, marked varicosities.
11. Condition of skin: Eruptions, open lesions, etc.
12. Evidences of disease or defects not listed above: Any physical condition not covered above which affects general health of applicant or suitability for class of work.

Definite Causes for Rejection:

No person shall be employed

who has an infectious or contagious disease.
who has lost the use of an arm, hand, foot or leg.
who has a hernia.
who has an organic heart disease.
who has a disstolic blood pressure of 100 nor whose systolic pressure is not appropriate for the age of the applicant.
who has an acute venereal disease.
who cannot read newsprint without eye glasses with a distant vision rating of 20/200 with each eye unless such vision is corrected with glasses to 20/40 for distant vision and ability to read newsprint with one eye.
who cannot hear normal conversational voice at 20 feet.
who is subject to epilepsy.

who has marked disabling hydrocele or varicocele whose physical condition is such that employment on any project in the district may prove harmful to his health and well-being or the health and well-being of another employee.

NOTE: To be made in triplicate with original to Division Engineer, Northwest Division, U.S. Engineer Department, 1142-128th Street, Edmonton, Alberta, Canada. 1st copy to District Engineer of the Engineer District involved. 2nd copy to be retained by the contractor.

WAR DEPARTMENT
Corps of Engineers, U. S. Army
Northwest Division
Edmonton, Alberta, Canada

Contract #

Date _____ City _____
Name _____
Address _____
Employee is to serve as _____ at _____
Race _____ Citizenship _____
1. Age _____ Height _____ Weight _____

2. Medical History See attached medical history form 3 MD 2 MWD.

3. Eyes: (a) Without glasses R ____ L ____ (b) With Glasses R ____ L ____

4. Ears: (a) General _____ (b) Whispered Voice: R ____ L ____

5. Mouth: (a) Gums, Mucous membrane: _____ (b) Teeth: _____

6. Heart: _____

_____ Blood Pressure _____

7. Respiratory Organs _____

8. Abdominal Muscera _____

9. (a) Hernia _____

(b) Hydrocele _____ (c) Varicocele _____

10. Venereal Disease _____

11. Bones, joints & Muscles _____ Varicose Veins _____

12. Neurological _____

13. Condition of Skin _____

14. Anal Examination _____

15. Disease or Defects not listed above _____

16. In my opinion the applicant (IS) (IS NOT) physically capable of properly performing the duties of a _____
(State trade or position)
at any location under all climatic conditions.

MD 1 NWD
Form #2

_____
Examining Officer

WAR DEPARTMENT
Corps of Engineers, U. S. Army
Northwest Division
Edmonton, Alberta, Canada

DATE: _____

CONTRACT NO._____

EXCEPT AS NOTED BELOW, I HAVE NEVER HAD ANY OF THE FOLLOWING:

1. NERVOUS BREAKDOWN OR OTHER NERVOUS OR MENTAL DISORDER.
2. CHRONIC OR RECURRING STOMACH OR INTESTINAL OR GALL BLADDER DISORDER.
3. SEVERE OR INCAPACITATING INJURIES.
4. RUPTURE OR HERNIA OF ANY TYPE.
5. ALLERGIC CONDITION SUCH AS HAY FEVER? ASTHMA, SINUS TROUBLE, MIGRAINE HEADACHES.
6. VENEREAL DISEASE.
7. EPILEPTIC SPELLS OR ANY FAINTING ATTACKS.
8. TUBERCULOSIS, CHRONIC BRONCHITIS, ASTHMA OR ANY OTHER CHRONIC PULMONARY DISORDER.
9. DIABETES.
10. ANY FORM OF RHEUMATISM OR ARTHRITIS: ANY BACK PAIN OR WEAKNESS: SWOLLEN ANKLES.
11. HEART TROUBLE: KIDNEY TROUBLE: SHORTNESS OF BREATH.
12. EAR TROUBLE.
13. EXCESSIVE USE OF ALCOHOL OR SEDATIVES: USE OF NARCOTICS.

IN ADDITION, I CERTIFY THAT I HAVE NEVER BEEN DISCHARGED FROM ANY JOB BECAUSE OF INTOXICATION: NOR HAVE I BEEN DISCHARGED FOR MEDICAL REASONS, OR WITH PREJUDICE, FROM ANY CONSTRUCTION WORK UNDER THE SUPERVISION OF THE WAR OR NAVY DEPARTMENTS.

WITNESSED BY: SIGNED: _____

_____ ADDRESS: _____

_____

PHYSICAL CONDITIONS THAT ARE CAUSES FOR REJECTION OF APPLICANTS FOR EMPLOYMENT IN THE NORTHWEST SERVICE COMMAND.

Any former employee of the United States Government or United States Government Contractor who has been discharged for medical or administrative (misconduct) reasons will not be considered for rehire.

4-F cases will be carefully investigated, when so classified conditions for rejection as listed herein will pertain.

Cases discharged from the armed forces of the United States or Canada will be carefully investigated to determine the cause. The causes for rejection as listed herein will pertain.

AGE, any applicant over sixty years of age, will be rejected.

ALCOHOLISM, chronic, or inebriation at the time of examination.

ANEMIA,

ANGINA, Pectoris, history of -

ARTHRITIS, chronic, moderate to severe, with or without deformity, or history of rheumatism which has interrupted duty or required medical attention.

ASTHMA, bronchial, either on physical examination or history of treatment for same. Other pulmonary diseases which have caused distress, dyspnea, pain, etc. (Acute pulmonary disease or upper respiratory infection should be deferred until sympton free before making physical examination).

ATROPHY, Muscular, if it is believed same will interfere with the proper performance of duty for which application is being made.

BACK PAIN, low, constant or recurrent. History of back injury with residual limitation of motion sufficient to interfere with the performance of duty for which application is being made. Muscle spasm of lumbar group at times of examination is also cause for rejection.

BLOOD PRESSURE, systolic 170 or over; diastolic 100 or over, at first examination, or if repeated for several days; systolic 150 or over, diastolic 92 or over is cause for rejection.

BLINDNESS: absence of, or blindness in one eye, when corrected vision in remaining eye is less than 20/40 (See cataract)

BRONCHITIS, chronic, either on physical examination or history of treatment for same. Acute pulmonary diseases which have caused distress, dyspnea, pain, etc. (Acute pulmonary disease or upper respiratory infection should be deferred until symptom free before making physical examination.

CATARACT, or other chronic disease of one or both eyes. (See Blindness and Vision).

COLITIS, chronic, or history of chronically recurring intestinal upsets.

DEAFNESS, total in one ear with less than 15/20 hearing in the other ear, or hearing of less than 15/20 bilateral.

DENTAL DEFECTS, less than four (4) pairs of opposing masticatory teeth and/or less than three (3) pairs of incisors opposed. Moderate or severe peridentoclasia, pyothan three (3) pairs of incisors opposed. Moderate or severe peridentoclasia, pyorrhea or gingivitis. Edentulous upper and/or lower in the absence of serviceable dentures in use. Defects as listed above will not be waived unless applicant is to be hired for work where dentist (civilian) is available and applicant agrees to have dental defects corrected within a period of not more than thirty days. If at the end of the thirty day period no effort has been made to meet this agreement an administrative discharge will be instituted.

DISLOCATION, shoulder, recurrent, or history of disability with residual discomfort recurring as a result of original dislocation.

DRUG ADDICTION.

ENCEPHALITIS, residuals of,

ENDOCRINE DISEASE, if it is believed that same will interfere with duties for which application is made.

EPILEPSY, or history of fainting spells.

FRACTURE, old fracture of ankle, history of open or closed reduction with recurrent pain or disturbance of function. Old fracture of any other joint in which there is marked limitation of motion and sufficient to interfere with the performance of duty for which application is made.

GASTRIC NEUROSIS, (nervous stomach).

HAY FEVER, or history of same which has necessitated change of climate, or has required medical attention. Any other allergic phenomenon which has required medical attention is also a cause for rejection.

HEART DISEASE, either organic or functional, including: Neurocirculatory asthenia, cariac neurosis, history of angina pectoris, history of precordial pain and/or dyspnea on exertion.

HEMORRHOIDS, bleeding type, regardless of degree; internal and/or external, moderate without history of bleeding.

HERNIA, Inguinal, umbilical, or incisional, is cause for rejection for OTHER THAN SEDENTARY OCCUPATION, EVEN THOUGH SMALL. If acceptable otherwise for sedentary type work may be considered for waiver if small.

HYDROCELE, moderate.

HYPERTHYDROIDISM, or expothalmic goitre.

HYPOTHYROIDISM, with obesity, marked.

INDIGESTION, recurrent for any cause.

JOINT - Internal derangement of knee joint, including: Locking of joint from any cause (trick knee); History of operation on joint with less than 3 years freedom of symptoms or history of continuous work in same classification as that for which application is made and work has been performed without symptoms for a period of 18 months without job being terminated for medical reasons.

MIGRAINE, or recurrent incapacitating headaches (see Asthma and Hay fever).

NEPHRITIS, acute or chronic.

NERVOUS SYSTEM, diseases of, (a) FUNCTIONAL, (1) psychoneurosis, cardiac or gastric neurosis, emotional instability; (2) psychosis; (3) constitutional psychopathic states (inadequate personality with or without emotional instability; pathological lying; sexual perversion, and criminalism). (b) ORGANIC (1) Tumor; (2) hemorrhage, residuals of; (3) encephalitis, residuals of; (4) all other conditions as elicited by history and/or by neurologic findings.

OBESITY, from any cause if it is believed same will interfere with performance of duty for which application is made.

OSTEOMYELITIS, acute or chronic, also recent history of same.

OTITIS MEDIA, acute or chronic, with or without history of recurrent discharge. Performation of tympanic membrane calls for careful, interrogation regarding discharge if absent at time of physical examination. Perforated tympanic membrane, even in the absence of a history of recurrent discharge are questionable risks and may be considered only for acceptance with waiver and for indoor occupation where temperatures remain at an even level.

PES PLANUS, with eversion, symptomatic, or otherwise symptomatic weak foot.

SCOLIOSIS, marked, with or without recurrent low back pain.

SKIN DISEASE, acute or chronic, or recurrent.

TUBERCULOSIS, pulmonary or any other form.

TUMORS, will be the cause for rejection except in the case of small lipomas in locations where same will not interfere with performance of duty.

ULCER, peptic (duodenal or stomach), history of symptoms within five years.

UNDERWEIGHT, marked, with or without known cause.

VARICOCELE, moderate.

VARICOSE VEINS, severe, with or without ulceration.

VENEREAL DISEASE, acute or chronic gonorrhea, syphilis, latent or otherwise, prostatitis, granuloma veneratum, granuloma inguinale.

VISION, when corrected with presently worn glasses, is less than 20/40 in both eyes with or without disease.

GENERAL: In the absence of any specific disqualifying defect, if the applicant appears generally below par and is not believed to have the physical stamina to perform the job for which application is being made he will be rejected. In such cases a notation, "General Physical and Constitutional Inferiority", will be entered in an appropriate place on the examination form which will also be marked "DISQUALIFIED".

Any other physical defect found, which is not listed above, and considered disqualifying by the medical examiner for the position applied for, will be cause for rejection.

Except for positions requiring special skill or technical training. The examination records of applicants falling in this category will be referred to the Office of the Service Command Surgeon. Headquarters, Northwest Service Command, for final approval, if otherwise physically qualified.

As of 1 March 1945

OFFICIAL:

/s/ CHARLES R. MUELLER,
CHARLES R. MUELLER
Colonel, Medical Corps,
Service Command Surgeon.

ARMY SERVICE FORCES
Headquarters, Northwest Service Command
and
Office of the Division Engineer
Edmonton, Alberta, Canada

SPNBO 1 May 1944

CIRCULAR LETTER NO. 80
(Office Service Branch No. 8)

SUBJECT: Medical Examination prior to returning to the United States.

TO: All Concerned.

1. All civilian and military personnel will receive a medical examination prior to returning to the United States on duty, temporary duty, leave furlough, etc., when traveling by aircraft operated by the Alaskan Wing, Air Transport Command. Such examinations will be forty-eight (48) hours prior to departure and will be guided by the following:

a. AR 615-250, 24 July 1942

b. WD Circular 276, 1943

c. WD TB MED 2, 3 Jan 1944

2. Station hospitals will make such examinations and will prepare a certificate reflecting data as may be required by the Alaskan Wing. Certificates will not be granted unless the required standards are met. Sufficient copies of the certificate will be prepared so that the traveler may retain at least one copy.

3. Commanding Officers are responsible for establishing the procedure with the Alaskan Wing and to enforce the provisions of this directive.

4. AR 615-250, requiring medical examinations prior to travel on Army Transports, remains in effect.

By command of Brigadier General WORSHAM:

C. M. CLIFFORD,
Lieutenant Colonel, General Staff Corps,
Executive Assistant, Administration.

OFFICIAL:
/s/ LUCIUS Q. C. LAMAR,
Captain, Corps of Engineers,
Chief, Office Service Branch.

FIGURE No. 1

BUTLER HUT - STEEL

20'x48'



PREFABRICATED BARRACK

20'x120'



CCC TYPE BARRACK

20'x120'



CHAPTER 5

Clothing

The manual "Supply Procedure" as approved by the Commanding General, Northwest Service Command, 17 March 1944, lists the following items of clothing and equipment in Section VI thereof:

1. Issues to Civilian Employees.

a. Clothing and equipment will be furnished civilian employees under the jurisdiction of Commanding Officers of Districts only when the work to which the employee is assigned requires special equipment which the employee cannot reasonably be expected to furnish at his own expense. All such issues will remain the property of the United States and a memorandum receipt account will be maintained by the Property Officer on such issues. All clothing and equipment issued civilian employees will be returned as soon as the mission for which the items were loaned has been completed. Equipment thus returned will, if practicable, be renovated, cleaned and sterilized and reissued.

b. Authorized issue to civilian employees, when deemed necessary by the District Commander, will be as follows:

(1) One sleeping bag
(2) One parka, alpaca or sheepskin lined
(3) One pair trousers, wool (ski breeches for female employees)
(4) One cap of wool knit, M-1941 or toque
(5) One pair of leather mitts with wool liners.
(6) One pair felt shoes
(7) One pair shoe packs or leather boots.
(8) One pair rubbers or overshoes
(9) One dunnage bag

c. New clothing will not be issued to civilians from regular Quartermaster supplies except in extreme emergencies, until such time as present stocks of arctic clothing purchased for civilian use, or already issued from Quartermaster stock to civilians, have been exhausted. Cleaned and renovated clothing will be issued to civilians whenever possible.

d. In addition to the items listed above, personal equipment required for accident prevention will be issued whenever necessary.

e. Before changing duty stations, civilian employees employed in District offices will be required to obtain a property clearance receipt, in the form of a letter from the District Property Officer, clearing their clothing and equipment accounts. District Property Officers will request District Transportation Officers to ascertain that employees possess property clearance receipts, before authorizing the issuance of travel orders

to employees making a permanent change of station.

2. Issues to Enlisted Men

a. The allowances as set forth in T/E 21 and changes thereto will be followed for issues to enlisted personnel within this Command, except for the following deviations:

(1) The following listed footwear will be authorized for issues within this Command:

(a) 1 pair Boots, blucher, high top, per individual
(b) 1 pair Shoes, felt, or shoes, felt, arctic per individual
(c) 2 pairs Shoes, service per EM
(d) 1 pair Overshoes, cloth top, per individual will be issued in lieu of overshoes, rubber top, (except at Skagway District, and the Air Corps which are authorized over-shoes, rubber top and/or shoe pacs when required.)
(e) Shoe pacs and rubber top overshoes will be taken up by the Quartermaster, disinfected by any method not injurious to rubber, paired, cleaned and crated.

(2) Shoe Rationing

Requests for purchase of shoes by individuals may be approved by their immediate Commanding Officer. Reference Section III, Par. 9, WD Circular 112, 1 May 1943, an OPA Form R-1705-B will not be issued in this Command.

(3) Towels, huck have been placed on a limited standard basis. Issues of this item will be made until stocks at respective distributing depots are exhausted. The authorized initial issue of one towel, bath and two towels, huck, has been modified to an authorized issue of two towels, bath, and the complete elimination of the item towel, huck (SPOXE 425 (11 June 1943).

(4) Sweaters, sleeveless

Headquarters, Army Service Forces, has directed that present stocks of this item be utilized for special issues during this winter. Sweaters, sleeveless, stock numbers 55-S-64434 to 55-S-64450, declared "Limited Standard" SPQIC 420 (7 Sept. 1943).

(5) Additional allowances for Military Police

(a) Headquarters, Army Service Forces, has approved an additional issue of one coat, wool, serge, olive drab, as required in addition to the Tables of Equipment No. 21, allowances of one to each enlisted man assigned to duty as a Military Police Train Guard. SPQXA 421.1 (22 Sept. 1943).

(b) Additional issue above allowance in T/E 21 of one pair trousers, wool, O.D., and one shirt, wool, O.D. has been authorized for issue to each enlisted man assigned to duty as Military Police Train Guard. SPNSW 421.1 (5 Nov. 1942).

(6) Fatigue Clothing

(a) Suits, working, one piece, H.B.T., Issues of this item will be held for issue to Army Air Forces personnel only. Stocks of this item will be maintained for this purpose only.

(b) All other personnel within this Command will be issued 2 piece suits. Two trousers, H.B.T., and two jackets, H.B.T. per individual.

(c) Caps, H.B.T., are authorized for issue in accordance with T/E 21, but all hats, H.B.T., will be utilized to the fullest extent prior to issuing caps, H.B.T.

(7) Class X Clothing will be utilized to the fullest extent within this Command as set forth in Par. 16, AR 615-40.

(8) Helmets, Steel, M-1917 turned in or exchanged for helmet MI will be shipped to the Transportation Officer, California QM Depot, Chevrolet Wholesale 69th and Foothill Blvd., Oakland, California.

The above issues were governed by AR 35-6520, AR 35-6640, AR 615-40, ASF Manuals M 401, M 402, M 403, M 501, WD Circulars 112 and 158, 1943; WD Circulars 7 and 94, 1944, ASF Circular 93, 1944, TM 38-220, Division Circular Letter 169, NWSC Letter, "Accountability for Equipment in the Northwest Service Command," dated 12 April 1944.

It may be well to indicate here that a number of officers, including the author, received full overseas equipment in the United States and had little or no use for any of it in this Command. The author was stationed at Carlisle Barracks, Pennsylvania, in November 1943, when he received WD telegraphic orders to proceed without delay to Headquarters, Northwest Division, Edmonton, Alberta. In the two hours lapsing before train time he was loaded down with the following items: 2 batteries, 1 flashlight, 1 bag, canvas, field, 1 basin, canvas, folding, 1 case, canvas, dispatch, 1 roll, bedding, waterproof, 3 blankets, wool OD, 1 tape, cotton, ident tag, 1 ointment, protective, 1 book, message, 1 hat, service, 1 belt, pistol, 1 can, meat M-1910, 1 canteen, M-1910, 1 cover, canteen, M-1910, 1 cup M-1910, 1 fork M-1910, 1 knife, M-1910, 2 lines, tent S.H. guy, 10 pins, tent, S.H. wood, 1 packet, magazine, web, dub., 2 poles, tent, S.H., 1 pouch, 1st Aid packet, 1 spoon M-1910, 1 suspenders, belt, 2 tags, identification, 2 tent, shelter half, 1 whistle, CO. Commander, 1 locker, trunk, 2 covers, mattress, 1 helmet, steel, M-1, 1 liner, helmet, 1 headband, 1 neckband, 1 cap, wool knit. These items were carried approximately 2300 miles to Edmonton and another 400 odd miles to Dawson Creek, B.C., and kept intact until 1 April 1944, by which time he had covered some 4000 miles on road inspections and assured himself there was no need for any of the items listed before turning them in intact. This experience was duplicated by many other officers.[8]

Officers arriving in this Command from the United States received the following items of Arctic issue at the Chicago Quartermaster Sub-Depot, Edmonton, Alberta, all of which were useful and necessary for field assignments:[8]

1 Bag, sleeping, Arctic
1 Boots, blucher, high top
1 Comforter, wool-filled
2 Insoles, felt
1 Jacket, field, Arctic
2 Mitten, insert, trigger finger
1 Mitten-shell, trigger finger
1 Overcoat, parka type
1 Overshoes, Arctic
1 Shoe pacs, high
3 Socks, Arctic
3 Socks, burlap
1 Sweater, high neck
1 Sweater, sleeveless
1 Toque, wool, knit
1 Trousers, kersey-lined
1 Goggles

Cold weather clothing for all personnel, civilian and military had to be supplied in quantities sufficient for the proper protection of every individual assigned to the Command. Arctic issues of clothing were adequate and well designed. It may be said that it was light in weight, considering the climate, and provided sufficient insulation to satisfy the normal demands. Proof of the adequacy of such issue is demonstrated in the very low incidence of frostbite (Cf. Vol. III, last chapter "Environmental Disease"). The indispensable item for all on travel status was the sleeping bag. There was no substitute for the sleeping bag in the early construction period when men had no quarters other than pyramidal tents. It had no substitute when car trouble between stations on the highway meant many hours of waiting, without heat for relief. The Air Transport Command also required that it be carried by all passengers on their aircraft.[3]

CHAPTER 6

Housing

The following types of housing units have been provided in this Command:[8]

a. Pyramidal tents, 16' x 16'

These were normally winterized and used only in the early period (1942-43) of the project pending the construction of more adequate types of units.

b. Stout Huts, 16' x 16' and various other lengths and widths

These were prefabricated structures that became drafty after several dismantlings. They were poorly designed for natural light and were used mainly for the housing of contractors' employees on short term construction jobs. For the most part they supplemented more adequate types of units during periods of temporary housing shortages.

c. Butler Huts, corrugated metal, 20' x 48'

These were used principally by a number of troop elements thru their periods of occupation. Some of the military personnel have complained that they are hot in summer and cold in winter. They do permit sunlight and ventilation only from the ends of the structure, excepting for what ventilation is obtained thru roof vents. These units were occasionally constructed in lengths other than the size indicated.

d. Quonset Huts, 16' x 36'

These were prefabricated in sections. Units of 30' width were also constructed in varying lengths to serve as theatres, etc. These have been used by military and civilian personnel, but to a lesser extent than Butler huts. They are similar to the Butler hut in shape, excepting for vertical walls, but more maintenance problems are involved. Usually windows were provided in the sides, particularly when long lengths of such structures were used. These units were interconnected and used extensively in Standard Oil camps for general purposes, including quarters, mess halls, recreation halls, etc.

e. National Huts.

These were prefabricated in 8' wall sections and were used principally for classrooms, recreation rooms and quarters.

f. Cemesto Units

These, a product of the Celotex Corp., were used usually as four room family quarters, to a limited extent, principally in Standard Oil areas.

g. Cowin Huts and Butler Shops were also used for shop types of structures shown on attached perspective drawings.

h. T/O Frame Buildings, 20' x 120'

The theatre of operations type of structure was used extensively in a variety of sizes. Included in this group are the Skagway, Dawson Creek and Edmonton Station Hospitals. This is a semi-permanent, non-prefabricated type of structure that proved very satisfactory. The Relay Inspection Stations on the Alaska Highway were a fire-proofed modification of this type of structure. The units were used extensively by civilian and military personnel in both large and small, isolated camps.

i. CCC Buildings, 20' x 120'

These were prefabricated units used extensively throughout the Command for a wide variety of purposes, principally barracks and mess halls. The Whitehorse Station Hospital is also made up principally of CCC units. They are considered inferior to the T/O unit from the standpoint of maintenance for the period of expected use by this Command. Being of prefabricated construction they are not as airtight as the T/O unit, hence heating is a factor in this climate.

j. Loxtave Buildings, 20' x 48'

The Director of Repairs and Utilities indicates that this is the best type of housing unit in the Command. This is of prefabricated lock joint construction, of Canadian design by Prefabricated Building, Limited. They are airtight and have lower general maintenance cost. The Whitehorse Railhead had this type of building but none of the larger hospital units were of this type.

k. Gloekler Units, 30' x 120' and other sizes.

These are similar to the National hut in construction but are heavier, more durable and better insulated. Many of this type were used in Skagway and Haines and a lesser number in Whitehorse. They are considered the best American prefabricated unit used here. The dismantling cost is less than for the loxtave type and it has almost parallel advantages in all other respects.

l. The Repeater Stations throughout this Command are of special frame construction, fireproofed with asbestos shingling and transite roofing.

Heating was almost universally done with oil burner "space heaters." There were several major exceptions to this method of heating. All of the Station Hospitals had modern steam heating equipment. The Whitehorse and Skagway system is oil fired, that at Edmonton employs gas. The Repeater and Relay Stations had modern oil fired hot air heating systems excepting where a local coal supply was available in the Fort St. John - Ft. Nelson Area. It is reported by R&U that the Repeater Stations from Blueberry to Swift River and the Fort St. John and Ft. Nelson Airbase installations employ coal as fuel. In the early days of the project, before sufficient space heaters were available, many wood burning stoves were contrived out of steel oil drums.[8]

In the very early stages of the project it was necessary to house men in pyramidal tents, even before flooring could be provided. Housing units of the Butler, Quonset and CCC types were rapidly constructed and the minimum allowance of 40 square feet of net space per man could soon be extended. Thru the major period of occupation, particularly after March 1944, 60 square feet or more per man were available. There were occasions in transient quarters in line camps when it became necessary to crowd the men in open barracks but this condition seldom existed and at most was limited to overnight stops. Head to foot sleeping was universally established at all times. In civilian line camps, units were partitioned off, frequently providing two men to a room. Even in such instances room checks were made by sanitary officers and maximum space between heads of beds was required.[8]

Pit latrines, equipped with heating units, and home-made showers had to be used as late as 1943 in some camps, particularly military. By 1944 flush toilets and shower units were installed. Many of the camps had separate wash houses but most had these facilities installed in individual units. In 1945 Highway Maintenance camps were established

FIGURE No. 2

COMPANY STREET

WINTERIZED PYRAMIDAL TENTS

16'x16'



COMPANY STREET

LEFT FOREGROUND - BUTLER HUT

RIGHT FOREGROUND - CCC BARRACK

IN BACKGROUND - PREFABRICATED

AND THEATRE OF OPERATION

BARRACKS



on a Canadian family basis, preparatory to turning the highway over to Canada. In these camps barracks were converted into 4 and 5 room apartments with modern water and sewer facilities. Normally 5 families occupy a maintenance camp. One central walk-in type refrigerator was provided and sectioned off for the individual needs. The era of hardship and inconvenience was over.[8]

Attached hereto are photos of winterized pyramidal tents and interior views of frame units used in this Command.[8]

M E M O R A N D U M

NWDEN 10 December 1945

SUBJECT: Prices Various Type Huts

FROM: Engineering Branch TO: Post Engineer, Whitehorse
Attention: Dave Hughes

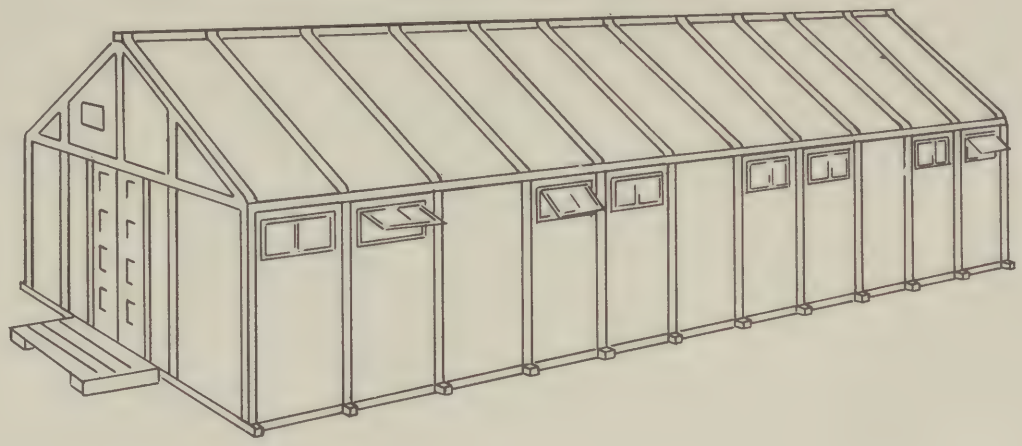
1. Per our telephone conversation regarding prices various types of huts f.o.b. destination or factory, I contacted Mr. Misgen of Central Procurement, Air Installations Division, and obtained the following prices f.o.b. Edmonton:

Loxtave	20 x 96	$2,392
CCC	20 x 96	2,392
National	20 x 48	1,057
Butler	20 x 48	1,045
Cowin	24 x 48	2,500
Gloekler	30 x 120	2,870

CARROW

WAR DEPARTMENT

CORPS OF ENGINEERS — U. S. ARMY



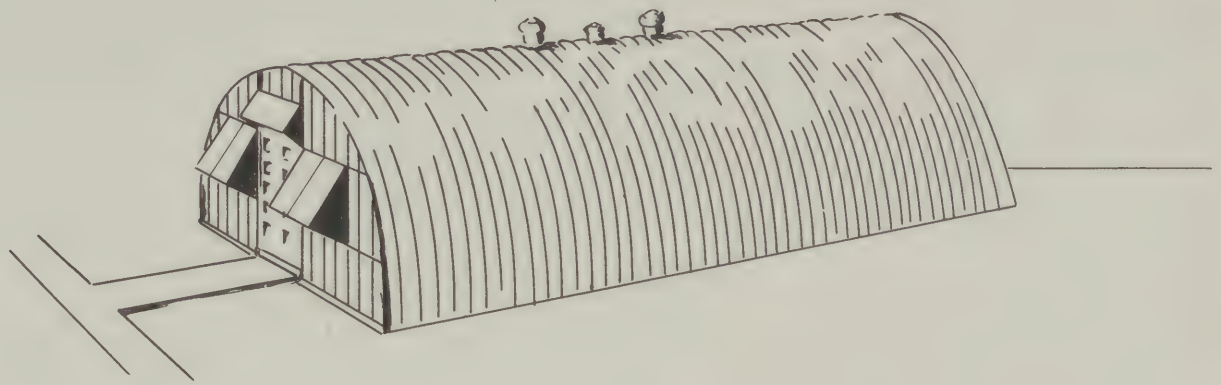
PERSPECTIVE DRAWING
of
STOUT HUT

N.W. Division EDMONTON, CAN.
SKETCHED BY B.D July 15, 1943

SIZE: 20'-0" x ANY LENGTH DESIRABLE IN 4'-0" SECTIONS
HAS WIDE RANGE OF ADAPTABILITY TO VARIOUS OTHER WIDTHS.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



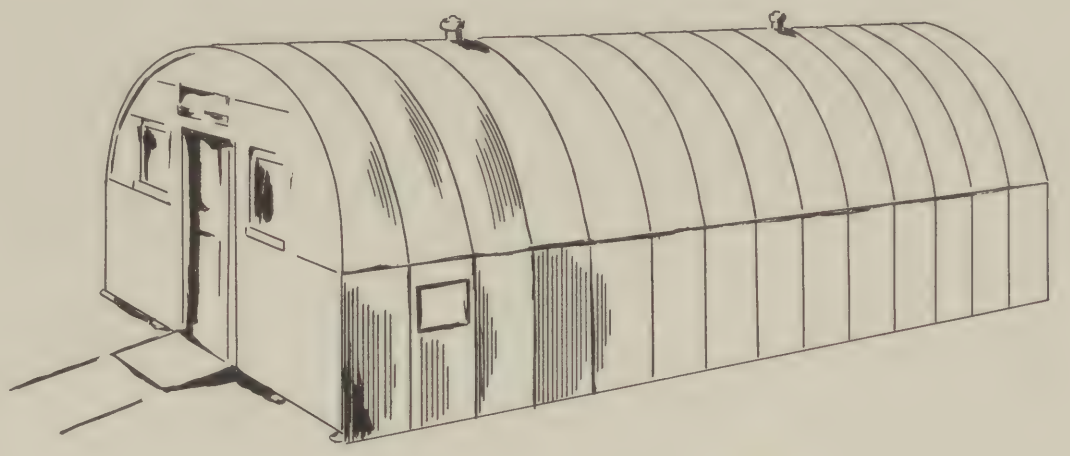
SIZE – 22' x 48' x 11' HIGH AT HIGHEST POINT
CONSTRUCTED OF CORRUGATED METAL SHEETS

PERSPECTIVE DRAWING
of
BUTLER HUT

N.W. DIVISION EDMONTON, CAN.
SKETCHED BY GFL JULY 30, 1943

WAR DEPARTMENT

CORPS OF ENGINEERS - U.S. ARMY



SIZE - 16' X 30'
ROOF IS OF CURVED CORRUGATED STEEL SHEET
SIDE REG. STRAIGHT CORRUGATED SHEETS
FRONT ELEV. PLYWOOD

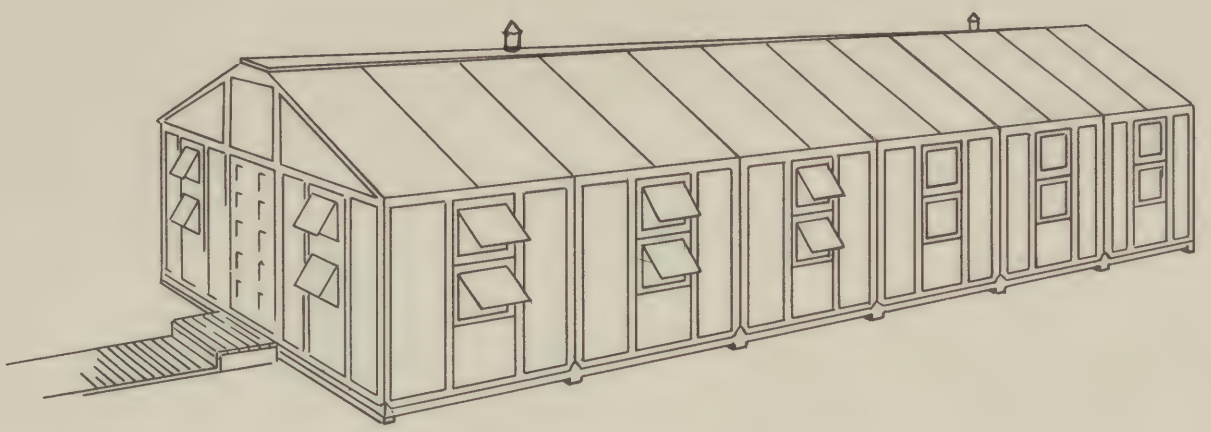
PERSPECTIVE DRAWING
of
QUONSET HUT

N.W. DIVISION EDMONTON, CAN.
SKETCHED BY b.D. JULY 15, 1943

48 9542

WAR DEPARTMENT

CORPS OF ENGINEERS – U.S. ARMY



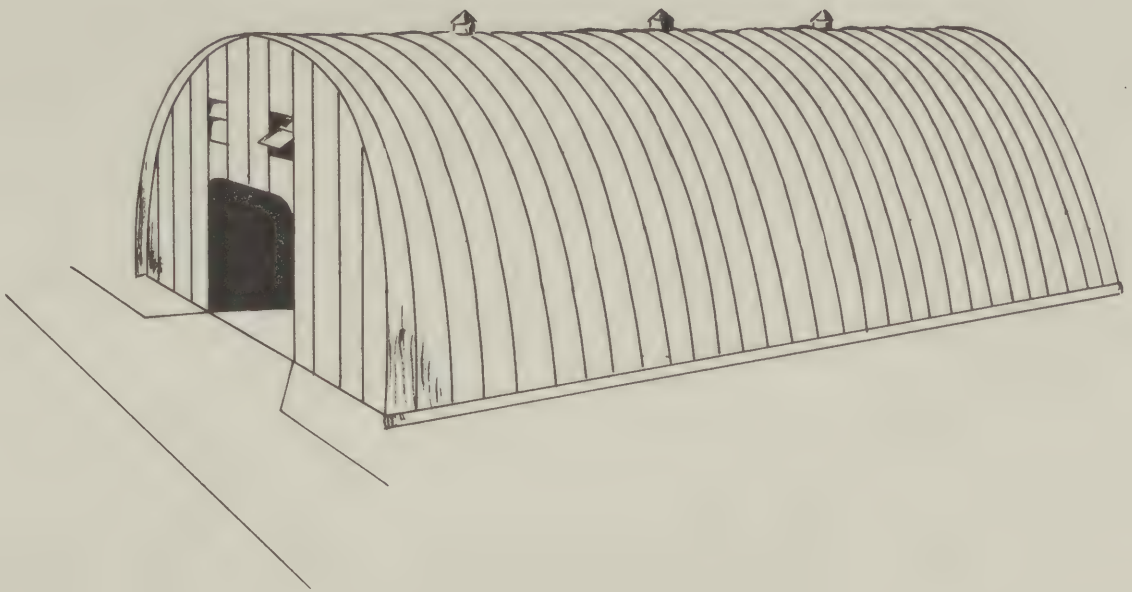
PERSPECTIVE DRAWING
of
NATIONAL HUT

N.W. DIVISION EDMONTON, CAN.
SKETCHES BY JULY 15, 1943

SIZE- 20'-0" x ANY DESIRED LENGTH IN 8'0" WALL SECTIONS

WAR DEPARTMENT

CORPS OF ENGINEERS - U.S. ARMY



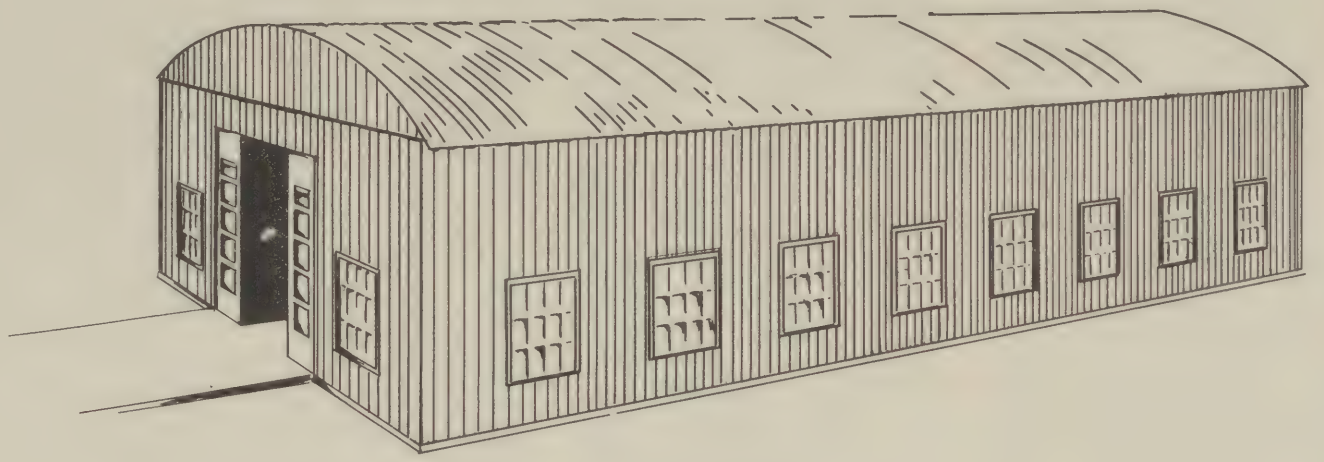
SIZE: 36'-0" x 61'-0 x 18'-0" AT HIGHEST POINT

PERSPECTIVE DRAWING
of
COWIN HUT

N.W. DIVISION EDMONTON, CAN.
SKETCHED by b.D. JULY 15, 1943

WAR DEPARTMENT

CORPS OF ENGINEERS - U.S. ARMY



SIZE—40' x 80' x 20 HIGH AT HIGHEST POINT - CAN BE MADE LONGER

PERSPECTIVE DRAWING
of
BUTLER SHOP

N.W. DIVISION EDMONTON, CAN.
SKETCHES BY EFL JULY 15, 1943

CHAPTER 7

Nutrition

At the beginning of operations in this territory food supply was mostly by means of "C" and "K" rations. However, as the projects progressed improvements were made in food supply to the point where it was equivalent to the finest in the Army. The first troops ate in the open or in mess tents. Such conditions would make any food unpalatable. However, normal refinements came with the construction of mess halls.[3]

In a letter to the Surgeon General from the Service Command Surgeon (Chief of Medical Branch) dated 3 April 1943, the following observations were made:[4]

a. The following conclusions are drawn from answers to a questionnaire sent to all organizations and from some personal observations and investigations. At present, approximately 60 per cent of the dietary of all units is composed of Expeditionary Ration No. 2. The other 40 per cent consists of fresh meat, fresh vegetables and fruit. There has been a gradual decrease in the extent to which this ration has been used since troops first arrived here. The extent to which this ration has been used had depended on the location of troops and the transportation facilities available. Supplementation of this ration was begun as soon as possible where practical and gradually increased with the establishment of better communications until December 1942 when all troops of this Command were receiving Field Ration A.

b. Fresh meat has been substituted for canned meats and has been used extensively since December 1942. Other modifications of this ration has been the substitution of fresh vegetables and fresh fruits for similar vegetables and fruit on Expeditionary Ration No. 2 when possible.

c. The conflicting reports received on the adequacy and acceptability of the dietary prior to January 1943 is attributed to variation in the degree of supplementation. The diet as modified at present is satisfactory. The unmodified Expeditionary Ration No. 2 is nutritionally satisfactory, but becomes unsatisfactory after continuous use for approximately two months because all the canned meats, carrots, beets, spinach and potatoes become unappetizing due to the frequency of use. Meat and vegetable hash and stew, corned beef and corned beef hash also become unacceptable because of similarity in taste. The butter substitute on this

ration is unacceptable because it leaves a taste that is disagreeable. The powdered eggs are unacceptable because it is difficult to prepare them in large quantities and make them appetizing.

d. Approximately 90 per cent of the food arrives in condition suitable for use. Early this winter most of the perishable articles were frozen when they reached their destination, however, it was possible to salvage all of these articles except celery, tomatoes and citrus fruits. This is now obviated by the use of refrigerated trucks.

e. Approximately 50 per cent of the units modify the ration supplied to a minor extent. These modifications are based on the availability of equivalent kinds of local supplies and are made because certain items of the ration are not particularly acceptable over long periods of time and because of preference of troops for fresh meat, eggs and vegetables.

f. Substitution of food of local origin for parts of the expeditionary ration results in the accumulation of reserves of similar unused foods at the depots to a minor extent. This is taken into consideration by the quartermaster and future rations are made so that the reserved accumulated remain nutritionally adequate and satisfactory.

g. Twenty-eight per cent of the units report that some of the food is subjected to long cooking and standing before service. This is particularly attributed to keeping food warm for men who cannot eat during regular meal hours and partially to carelessness or lack of training of the cooks in preparation of the food. About 10 per cent to 15 per cent of the unsuitability of rations is due to lack of training of the cooks in handling rations. The chief type of failure are overcooking, undercooking, and failure to use many of the recipes suggested to vary the diet.

h. The allowance of lemon or equivalent powder is completely consumed in the summer but very little in winter. It has been largely supplanted by fresh fruit. Very little evaporated milk has been issued. All evaporated and powdered milk is consumed. Forty per cent of the units report that the canned leafy or yellow vegetables are not completely consumed. The enriched flour is completely consumed.

i. Approximately 40 per cent of the vegetables issued are dehydrated. About 90 per cent of the cooks prepare these vegetables properly so that they are palatable and acceptable when used to this extent. There is a preference for the dehydrated potatoes.

j. A hospital unit added thiamine chloride to the diet because of lack of confidence in the ration. None of the other troops have received vitamin concentrates. A few units have reported that a very small per cent of the troops have shown evidence of nutritional disturbance due to failure to consume the ration because of its monotony. These troops complained of anorexia, general malaise and loss of weight. There has not been any definite evidence of nutritional disease. The high incidence of dental caries is believed due to excessive consumption of sweets and poor oral hygiene rather than to a dietary deficiency. There has been a slight general gain in weight among members of this Command.

In August 1943 nutrition on the whole has been reported as satisfactory in this Command, using Field Rations supplemented by vegetables and fruits, amounts depending on transportation facilities. Type of ration used is "B", "D", "C" and "K".[2]

a. Nutrition of patients is also very satisfactory. Field rations supplemented by special ration components for the sick, and fresh fruits, vegetables and meats are used.

b. The above mentioned diets are nutritionally adequate and with the addition of fresh fruits and vegetables and meats are definitely acceptable.

At that time it was noted in the Essential Technical Medical Data Reports that in very cold weather, when fresh items are frozen and cannot be used it is often advisable to issue multivitamin capsules particularly useful in combating C and B complex vitamin deficiency. It was noted during the winter months that no specific types of gingivitis developed in many troops; some of it was believed to be due to lack of vitamin C and B, rather than poor dental hygiene. Such cases cleared up rapidly under improved dental hygiene and administration of ascorbic acid and thiamin chloride. It should be noted that while the diet furnished was adequate from avitamin standpoint, it frequently occured in some organizations that the diet became so monotonous that it was not acceptable from an estheitc standpoint. This was occasioned by inability to furnish variations in food elements because of shipping difficulties in bad weather.[2]

In October 1943 continuing improvement is noted in the status of nutrition of the Command, due largely to a more varied diet of fresh foods which have become available because of better transportation and storage facilities and more extended perishable subsistence inspection

service. The service is supervised mostly by the Veterinary Corps which has recently been augmented by more personnel. The nutrition adequacy and acceptability of the ration is satisfactory.[2]

In May 1943 it was estimated that 150 gallons of milk per day can be obtained for troops from Edmonton sources approved by the Northwest Service Command. Three milk processing plants with modern equipment have been so approved. Units stationed in Edmonton can be supplied directly by dealer delivery. The milk is processed in quart or half pint glass bottles. Installations such as the Air Base here are now using waxed fibre quart containers of an approved type for use on troop trains, and Army or commercial airlines. Such containers are imported from England and the supply in Canada is reported to be almost exhausted. Only small quantities of milk can be so prepared at a time since the fiber containers are sealed on a hand operated machine. In the past, small amounts of milk had been shipped to northern Air Forces stations in five-gallon milk cans by plane. Civilian and officer personnel have made, at railhead points, individual purchases of milk in one-gallon cans. Troops at Camp Prairies were recently shipped bulk pasteurized milk in milk cans. When milk cans are covered with insulating jackets and shipped in refrigerator cars, the product arrived in good condition. Samples of such milk have been kept for over five days after delivery under indifferent conditions without souring. Prior arrangements have been made with the Surgeon at Camp Prairie for his sanitary supervision of the milk after receipt, and during processes of dispensing. Comparison between various milk containers as related to shipping conditions in this area are as follows:[4]

(1) Glass bottles are not practical from the standpoint of breakage, waste in shipping space, difficulty of cooling in transit, and poor bottle return. Producer cannot release bottles for any but local deliveries.

(2) Quart fiber containers are satisfactory and to be preferred for small milk shipments to distant destinations by plane. Such containers will not be available in the future unless a new supply is obtained by the Army from the United States.

(3) Metal milk cans are satisfactory for shipping, but requires sanitary supervision of dispensing at destinations. Since it is believed that fresh milk should be supplied only in limited quantities in hospital, and to some units on rail lines, it is considered adequate sanitary control at destination can be obtained. Milk cans or other containers used for any shipment except local delivery should be provided by Army supply. Experience of the Canadian Army at Prince Rupert with milk dealers in Vancouver, B. C., indicate that dealer supply of milk cans can be very unsatisfactory to all concerned.

Surgeons in this Command generally consider that the canned issue of powdered milk is adequate as to nutrition, and palatable when properly prepared. However, it is often not properly prepared, and some state that for this reason consumption of it is insufficient in quantity. It is believed that the supply of fresh fluid milk instead of the powdered milk would be justified and to be desired in the following instances:4

(a) Daily to troops adjacent to approved sources of supply (Edmonton)
(b) To hospitals serviced by plane as requested by Surgeons for certain selected patients (peptic ulcers, etc.,)
(c) About once a week to troops at some railheads (example Camp Prairie).

(1) Such supply relieves monotony of powdered milk, and raises morale.

(2) Small unapproved sources of raw milk are found at all railheads. Milk handlers are not examined, cows are not disease tested, and sanitation is very poor. Occasional shipment of properly pasteurized milk should stop to a considerable extent the unauthorized consumption by troops of unsanitary unapproved, raw milk at such points. It is recommended that necessary authority be obtained to purchase pasteurized milk for delivery in cans as outlined above.

In July 1943 it was noted that Edmonton City milk supply needs a more careful inspection than is being carried out at the present time. The City Board of Health has regulations that if they were strictly enforced would improve the milk quality and decrease the danger of milk borne diseases. The city does not require milk supply to come from Bang's free cows, and, due to this, only a small percentage of the producers have their cows tested. It is estimated that twenty five per cent of all dairy cows in this area are infected with the disease. A strict conformance of pasteurization would help to overcome this danger. The city bases the quality of their milk on the methylene blue reduction test. We all feel that this is not a true indication of its quality. As we all know the bacterial content may be very high and the milk still used for human consumption with little danger of disease. While the methylene blue reduction test would prohibit the use of this milk, but at the same time would pass a milk of a low bacterial content that may be of a pathogenic type. In order to determine the true quality of milk and to help prevent the spread of milk borne disease, one should not only know the approximate amount of bacteria present, but also the kind and from where they are likely to be coming from. This information can be obtained from the direct microscopic examination and the coliform index. At the present time the city is not making microscopic examinations or running the coliform test on any of the milk going to the city of Edmonton. At

weekly intervals they collect a bottle of pasteurized milk from each dairy and run the standard plate count and the phosphatase test. The three dairies that supply the U. S. Armed Forces in this Area have the combined business of ice cream and butter making along with their retail milk business. All of them have the same "old cry" of not enough help and equipment to do the job the way they would like to do it, and still they are trying to do the work the easiest way in the shortest possible time with their business being 50 per cent above their normal capacity. At the present time we can overlook some of the failures to comply with certain types of equipment, but we cannot overlook unsanitary procedures, regardless of the vast volume of their business.[4]

At the main basis there were mess halls where as many as 500 people at a sitting were served wholesome food, including fresh meats, fruits and vegetables. The men at the line camps were equally well fed, and there was no rationing.[7]

All food supplies for the North were imported. At Canol however, the menu occasionally featured salmon-trout and whitefish (or grayling) caught by the local Indians or reindeer flown from Aklavik in the Mackenzie River Delta.[7]

The mess hall at Camp Canol constituted a serious problem to the local medical officer, as it was staffed entirely by civilians, who quitting their jobs on the slightest pretext caused a continuous turnover of personnel. The cooks for the most part were men with long experience in the North and did not take kindly to the suggestions of the medical officer in the interests of sanitation.[3]

The summer of 1944 was marked by what was virtually a tragedy due to neglect and improper food handling during shipment. Supplies for a period of about 6 to 9 months had been requested to be brought to Norman Wells down the Mackenzie River by barge. In some strange unexplained manner food barges carrying ham, bacon, eggs, oranges, and fresh fruits were moved on a barge from refrigerated boxes and covered simply with a tarpaulin, at Ft. Smith. During the 1500 mile trip the barge train had the misfortune of going aground while passing through the Green Island rapids, and it was three weeks before it could be refloated. When the barge arrived August 1944, the stench of rotting and decaying food could be noticed 100 yards away. On inspection it was found that the ham and bacon was covered with a thickness of gray green mold. The quantities injured were approximately 11,000 pounds of bacon and 9,000 pounds of ham. The ham and bacon, under the direction of the medical officer, were scrubbed with a vinegar solution and wire brushed and immediately placed in zero refrigerators. With fruits, black rot

was common, and approximately 40 cases of grapefruit and 80 cases of oranges were destroyed. In the case of eggs, four waitresses were instructed by the medical officer in the use of improvised candling lamps and all the eggs were candled. Thirty cases of eggs were destroyed and the remainder were graded into 40 per cent Grade "B" and the remainder Grade "C".[3]

As an example of what could happen under conditions of isolation and distance, a group of signal corps men were found improperly clothed and fed by the medical officer on a trip from Camp Canol. The men were located at Fort Wrigely, Northwest Territory, to which food was theoretically shipped every two weeks. In September 1944, when they were found to be existing on a limited supply of "C" and "K" rations, with diet definitely inadequate as well as clothing, no fresh meat had been received at Fort Wrigely in better than 7 weeks.[3]

It has been estimated that 1500 to 2000 calories more should be consumed in cold climates, unless of course one is engaged in an indoor occupation. Protein content should probably also be increased in that it has the ability to increase the rate of heat production. It is a known fact that Indians of the North subsist almost completely on meat. Vitamin C is also a requirement in the diet where food must all be shipped in and fresh fruits and vegetables are not easy to get. It was not necessary, however, to supplant the diet with any amount of concentrated vitamins. The lack of sunlight and the inability of individuals to "sun-bathe" could probably result in a lack of vitamin D, but no deficiency diseases were particularly noted in this respect.[4]

There was not a serious food problem during the winter of 1944 and 1945 at Camp Canol.[3]

Subsistence was obtained from Railheads established at Dawson Creek, Edmonton, and Whitehorse, plus warehouses in the larger camps, Skagway, etc. Quartermasters operated bakeries in strategic locations which provided very satisfactory service. The food supply was good, adequately meeting dietary requirements. It included vegetables, fresh and frozen meats, but no fresh milk, except in Edmonton. Canned milk and powdered were used exclusively.[1]

During the year 1944 arrangements were made with the cooperation of the Mess Officer at the Whitehorse Airbase to supply milk obtained through conversion of powdered milk in the so-called "mechanical-cow" (reconstituted milk.) The resulting product looked and tasted like fresh milk.[1]

In the Dawson Creek Area which was not too far removed from the city of Edmonton and was a railroad terminus, there was always an adequate supply of fresh meat, fresh vegetables and fresh fruits. Frozen meats remaining from stocks provided when transportation was difficult were used during the early part of 1944. Later, when transportation facilities were improved it was possible to procure fresh meat daily. The diet for the most part met the standards of nutrition.[1]

Every effort was made thru the history of the Command to adhere to War Department Supply Bulletin Master Menus. These were augmented by the Command Supply Division's Food Service Office which made minor alterations to allow for available food supplies. These master menus were forwarded to the Service Command Surgeon's Office for review, comment and approval approximately 4 months in advance. They were routinely found satisfactory.[8]

It was not until November 1945 that the veterinary and sanitary officers for the Northwest District were able to complete arrangements with the Edmonton City Dairy for the preparation of fresh frozen milk in quart fibre containers for distribution to military establishments on the Alaska Highway. As a limited amount of this product can be prepared the distribution has been confined to military establishments that are unable to obtain mechanical cow milk or fresh milk from approved sources. This product is transported in frozen condition by rail to Dawson Creek and by refrigerated truck to highway stations north to Muncho Lake, Mile 456. The product is shipped by air to Whitehorse and distributed by refrigerated truck to station on the highway north of Muncho Lake.[8]

Attached hereto are excerpts from Northwest Service Command Supply Division's Manual (Approved by C.G., NWSC, 17 March 1944), Part 6, Food Service Program.

SUPPLY PROCEDURE
NORTHWEST SERVICE COMMAND

PART SIX
SECTION TWO
FOOD SERVICE PROGRAM

1. THE DIRECTOR OF FOOD SERVICE

1. The Director of Food Service, under the command of the Commanding General of the Service Command, will be responsible for: the supervision and inspection of government operated or controlled messes, bakeries, the preparation of proper menus, and the enforcement of all published regulations on food. In order to carry out this responsibility, the following functions will be performed:

a. Mess Supervision and Inspection

(1) Elimination of food wastage.
(2) Distribution and consumption of food.
(3) Improvement of methods used in the preparation of food.
(4) Follow-up on distribution of all subsistance publications, including instructional material, posters, charts and operational aids.
(5) Studies and recommendations on general messing equipment problems.
(6) Review of all technical information releases pertaining to mess operation, conservation, and food in general.
(7) Provision of supervisor and inspector personnel for mess supervision within commands.
(8) Advise on all matters pertaining to troop train feeding.

b. Bakery Activities

Supervision of the operation of all camp and garrison bakeries within the command.

c. Menu Supervision and Inspection

(1) Supervision of all menus throughout the command.
(2) Preparation of menus for nutritional adequacy, dietary balance, and the procurement practicability.

(3) Transmittal to proper procuring agency of such menus with 90 days lead time in advance of period of use.

(4) Recommendation to Headquarters, Army Service Forces, relative to change in quantities in master menu and recommendations for improvement of same.

II. FOOD CONSERVATION

1. Commanding officers of all echelons are charged with the duty and responsibility for requiring that the maximum care and attention be given to the proper messing of troops, and civilian employees, the issue of rations, the prevention of accumulation of supplies in storerooms, the salvage of waste materials and to the end that the food supplies of the Command may be conserved to the fullest extent. Commanding officers of Class IV installations are responsible for seeing that the activities in connection with the Food Service Program are reported to this headquarters as required by Circular Letter No. 45, ASF, 3 July 1943, and ASF Circular Letter No. 112, 9 Nov. 1943.

2. District Food Supervisors, appointed by the District Commanding Officer, will be responsible for the following:

a. Supervision and inspection of messes.

b. Elimination of food wastage.

c. Enforcement of published regulation on food conservation.

d. Maintenance of records covering improvement and progress accomplished by individual messes in connection with the Food Service Program.

e. Submission of reports covering comments, surveys, mess inspection, and other pertinent data to this headquarters.

f. Forwarding recommendations to this Headquarters covering changes in quantities on the recapitulation sheet of the master menu or ingredients of the daily menu which is in excess or short of consumption requirements.

g. Preparation of reports in connection with the Food Service Program as required by existing regulations. In this connection, particular attention is invited to ASF Circular 112. All civilian messes organized under authority of AR 210-60 will be operated in the same manner as messes for army personnel. The necessary reports required by ASF Circular 112 will include all the aforementioned civilian messes.

h. Enforcement of published regulations or instruction pertaining to distribution, preparation and consumption of food.

3. All communications and reports relative to the Food Service Program will be submitted to this headquarters attention: Director of Food Service.

4. District Food Supervisor's reports in duplicate, will be submitted to reach this headquarters not later than the 7th day of each month.

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IX. RATIONS FOR PATIENTS IN HOSPITALS

1. All hospital messes in the Northwest Service Command will be operated under the field ration system. The issue of additional quantities of subsistence items to complete hospital rations is authorized. This issue is authorized for all patients both military and civilian. District Commanders will permit liberal substitutions of field ration items in order to effect adequate balanced hospital patient menus, and the charge for such rations, both military and civilian is hereby established as $1.00 per day (American Funds) and $1.10 (Canadian Funds). Payment will be made to the Mess Officer prior to discharge of patients from the hospital.

2. All funds so collected will be turned over to the Sales Officer for disposition as prescribed under paragraph 5, section VIII, Part Five.

XI. ISSUE OF RATIONS

1. Each unit or organization mess will be issued field rations by the subsistence officer of a District and/or District distributing point every ten days or more frequent intervals as circumstances may dictate.

2. Each unit or organization (Officers Field Ration mess where operated) mess will be required to submit to the subsistence officer of a District and/or District distributing point when rations are drawn, an inventory of all subsistence stores (perishable and non-perishable) on hand in the unit or organization kitchen. Inventories will be submitted to the subsistence officer prior to drawing the subsequent ration issue.

3. Each inventory will show total quantities of each item on hand together with the completed strength of the unit or organization for the next consumption period following the submission of the inventory.

4. Upon receipt of these inventories by the District and/or District distributing point subsistence officer, they will be edited and only quantities of subsistence items necessary to meet the requirements of the menu for the subsequent consumption period will be issued to the using organization.

5. Any large excesses of subsistence on hand in unit kitchens that are in condition for re-issue or storage will be turned in to the subsistence officer immediately by the unit or organization having such excesses.

XII EMERGENCY RATIONS

1. All units stationed in the outlying vicinity of each District and/or District distributing points will be furnished a ten days emergency Class "B" ration (which does not include any perishable subsistence items) together with a three day Class "C" ration and three day Class "K" ration.

2. This emergency ration will be kept separately in the unit storeroom or another convenient storage space and will not be reported on inventories required to be furnished subsistence officers of Districts and/or district distributing points prior to regular ration issues.

3. When cause arises to use all or part of the emergency Class "B" "C" and "K" ration, a report will be rendered to the District Commander giving reason for the emergency and quantities consumed. Upon receipt of such reports by District commanders the sales officer or the subsistence officer of the District and/or district distributing point will be directed to replace the quantities reported consumed.

XIV. SHIPMENTS AND RECEIPT OF PERISHABLE SUBSISTENCE

1. All perishable subsistence requisitioned for the District Commanding Officer, Skagway District and Whitehorse District will be shipped to the Port Transportation Officer, Subport of Embarkation, Prince Rupert, where all shipments will be received by the Port Transportation Officer. Shipments for Dawson Creek District will be received by the District Transportation Officer, Post of Dawson Creek.

2. Receiving reports covering shipments of perishable subsistence procured by the QM Marked Center, will be accomplished by the Port Transportation Officer. Subport of Embarkation, Prince Rupert, B. C., and by the Sales Officer at Dawson Creek for all perishable supplies received in bulk at their station.

3. Upon receipt of perishable subsistence, the Port Transportation Officer, Prince Rupert and the District Transportation Officer, Dawson Creek, will according to the manifest furnished by the Officer in Charge,

QM Market Center, and the information copies of requisitions furnished by the respective Districts, break down these shipments of perishable subsistence and make shipments to consignee.

4. Upon receipt of shipments by the sales officer, a tally-in will be accomplished and a legible copy furnished the Port or District Transportation Officer who made the shipment.

5. Requisitions for the perishable subsistence for Fairbanks District will be submitted to this headquarters and after being edited will be forwarded to Prince Rupert Subport of Embarkation for Trans-shipment to the Port Transportation Officer, Whittier, Alaska, and the Transportation Officer, Fairbanks, Alaska, marked for the requisitioning agency.

XVI. TROOP TRAIN RATIONS.

1. District Commanders will be guided by the provisions of WD Circular 341, 29 December 1943, as changed by Section VI, WD Circular 10, 6 January 1944, relative to furnishing rations to troop trains.

2. Menus for troop trains prepared as by the office of the Quartermaster General has been furnished all District Commanders.

XVII. FURNISHING SUBSISTENCE TO CIVILIAN CONTRACTORS

1. All civilian contractors located within the geographical limits of each district, will submit subsistence requisitions to the Executive Assistant in Charge of Supply for each district.

2. Upon receipt of these requisitions by the District Assistant in Charge of Supply, all requisitions will be filled from available stocks within the District and shipped to the respective contractors on a Shipping Ticket. Two copies of the Shipping Ticket will be signed by a designated representative of the District (commissioned officer). One copy of the Shipping Ticket will be forwarded to this headquarters and one copy will be maintained in file.

3. Upon receipt of the signed copies of the Shipping Ticket, the Sales Officer of each District will prepare Form 1080, revised, in accordance with the provisions of AR 35-860, 22 January 1944. It will be borne in mind that subsistence filled from available U.S.E.D. stocks within the district for which reimbursement has previously been accomplished on Forms 1080 will not require subsequent transfer of funds. In cases where U.S.E.D. subsistence supplies are available within the District for issue to troops for which reimbursement has previously been made by U.S.E.D., it will be the responsibility of the Sales Officer to accomplish the necessary

Shipping Tickets and Form 1080 to cover the credit of funds for the U.S.E.D.

4. All requisitions submitted by civilian contractors within the District which cannot be supplied from available stock will be included in the consolidated requisition which is submitted to the headquarters to cover all personnel (both Army and civilian) within the District.

5. Authority is granted Commanding Officers of the Districts to sell subsistence to civilian contractors on a cash or charge basis when contractors have entered into lump sum contracts with the U. S. Government. A 10% overhead charge will be made on such sales.

CHAPTER 8

Personal Hygiene

As reflected in the monthly sanitary reports thru the history of the Service Command and allied agencies personal hygiene has been generally satisfactory. The following elements of personal hygiene were investigated cooperatively by Medical, Dental and Sanitary Officers according to the provisions of AR 40-275 and other pertinent directives. (a) general health, (b) foot conditions of troops, (c) dental and oral conditions, (d) venereal diseases, (e) immunizations.[3]

There were no undue incidences of foot diseases, in fact, foot diseases were minimal through the history of the Command.[2]

Northwest Service Command Memorandum No. 235, Part II, Subject: "Dental Survey", dated 7 November 1943 stated:[3]

"1. All military personnel, including those hospitalized in this command will be given a special dental survey to determine their dental classification, as provided in par. 3, AR 40-510. Reference is made to Change No. 1, AR 40-510, 10 Sep 1942, which provides an additional subparagraph under par. 3b (1), quoted as follows:

"(d) Insufficient teeth to masticate the Army ration."

This change will place in Class 1, those who, in the opinion of the examining Dental Officer, have an insufficient number of teeth to masticate the army ration. A differentiation will be made between those who have a few missing teeth, as Class I, and those who have a few missing teeth, but not enough to necessitate replacements, as Class III.

2. Results of this survey will be submitted on WD MD Form No. 57, Sec. 4, to cover the report of dental service for the month of November. The words "Special Dental Survey" will be typed or written in the space immediately below the sections, designated as Class I, II, III and IV".

Thereafter at least once a year all military personnel stationed in the proximity of dental clinics were required to report for a dental survey. A Dental officer also made road surveys of dental conditions at the various outlying camps. A dental field set, including the portable chair was taken along on such trips, but it was usually found more expeditious to provide emergency care only in the field and have the men rotated into the clinic through the cooperation of the various company commanders.

The dental health of the Command was found satisfactory. The incidence of decay and gingival disorders was reported as "not above normal." It was found that Vincent's Angina was present in military personnel to the extent of 2 per cent of strength, in civilians 4 per cent of strength. Poor dental hygiene was observed more commonly in civilians. In areas more concentrated with civilians oral types of Vincent's on occasion reached epidemic proportions. This was particularly true where populated extra cantonment areas were simultaneously heavily infected. It frequently became necessary to place a number of local restaurants off limits for failure to comply with our Army sanitary requirements.[3] The Dental Surgeons concurred in the belief that there was in many cases a marked decalcification in the teeth among those individuals assigned to stations remote from a good supply of fresh milk and vegetables.[4]

When the Northwest Service Command was inactivated in June 1945 the Dental Surgeon provided the historian with the following report on his overall findings:[3]

"We have surveyed all the men in the Command at least once a year, making charts of the mouths and have followed up on these surveys. In order that the case needing immediate attention might be taken care of before further damage was done to the surrounding teeth. In some units where epidemics were present such as Vincents Stomatics, surveys were run as often as once each week until the epidemic was cleared up. This was done in order to discover the disease early, and avoid spread of the condition.

Removal of heavy calculi from teeth of all men to prevent periodontoclasia and gum infections has been done routinely.

Fillings that had poor margins or poor contact with proximal teeth to such an extent that food packs were present have been removed and replaced correctly in order to prevent later alveolar disorders.

Missing teeth have been replaced in so far as possible to prevent drifting of teeth and to avert the digestive disorders that arrive from failure to properly masticate the food.

All impacted and malposed teeth have been removed to avert infections neuralgia from pressure and to prevent further crowding of the arches.

All abcessed teeth or teeth whose supporting structure was injured beyond recovery either by trauma or infection have been removed to prevent there being foci or infection.

Lectures have been given on care of teeth and gums with a special attention given to brushing teeth and prevention of gingivitis. Private instructions have been given in any cases where there was a deficiency and brushing technique or where mouth pecularities caused special problems in mouth hygiene.

Some work has been done in prosthetic replacemnts to prevent a breakdown in moral such as replacing badly discolored mal-formed or badly crowded teeth with more esthestic dentures.

Studies have been made of drinking and eating habits of men in units where Vincent's stomatitis was prevalent and at times the causes were eliminated, as a result of these studies.

Everything possible has been done to insure that military personnel in this Command secure as nearly as balanced diet as possible. There has been a marked decalsification of teeth in the past but progress has been made on diets."

Company commanders and managers of civilian camps in the proximity of medical installations were required to send all foodhandlers to the out-patient department for monthly examination and procurement of food-handlers' certificates in accordance with the provisions of AR 40-275.[4] In such locations it was customary for the medical officer of the day to visit designated companies and conduct the monthly inspection of troops as they arose in the morning. (AR 615-250)[3]

Monthly, or as near thereto as was feasible, each station hospital sent a medical officer on an inspection trip of outlying camps. This involved a round trip by road of approximately 2,000 miles for the emissaries from both the Whitehorse and Edmonton hospitals. On these trips food-handlers in civilian and military camps were examined and food-handlers' certificates were issued. At such times all military personnel were also given the required monthly inspection. All men were repeatedly advised to (a) bathe once a day, (b) wash hands before each meal and always after visiting the latrine, (c) brush their teeth at least once a day, (d) keep their nails cut short and clean, (e) keep their hair cut short, (f) keep their clothing and bedding clean, (g) keep all soiled clothes in barracks bags. On such occasions individual immunization registers (W.D. A.G.O. Form 8-117) were checked and brought up to date. Because of the consistency of such routine inspections very few cases of venereal disease, not previously reported, were detected. Only on one or two occasions was a civilian camp temporarily handicapped due to the temporary restriction or removal of one of the mess personnel because of communicable infection.[3]

During the early period of the project there were no provisions for showers or bathing for personnel. Even in the summer months stream and lake water were found too cold for necessary ablutions. Bathing had to be accomplished by sponge bath and frequently this taxed the limited water supply. Such conditions were normal only to the period prior to the summer of 1943.[3]

By 1944 bathing facilities were generally adequate, with showers, in most locations, found in every quarters.[1] Sufficient hot water was supplied by oil burning hot water heaters.[1]

As with bathing facilities, there were no laundry facilities available until the projects advanced sufficiently to permit the construction of such establishments. Quartermaster laundries were established at Skagway, Whitehorse, Charlie Lake (53 miles north of Dawson Creek), and Edmonton. These provided excellent laundry and dry cleaning services to both military and civilian personnel. Though housed in temporary structures these installations had up-to-date equipment. When the Skagway laundry was closed the service out of Whitehorse, via White Pass and Yukon Railroad, continued to be satisfactory.

CHAPTER 9

Water

Appended to this chapter is a complete water survey for this Command conducted between 31 March and 15 June 1944. Because of the vastness of the area and multitude of camps envolved at that time the survey was conducted in various areas and districts by locally assigned personnel. The survey was conducted at the instigation of the Surgeon General in his letter to the Service Command Surgeon, subject: "Sanitary Surveys of Water Supply Installations in Accordance with AR 40-205".[4]

The problem of a safe and potable water supply has been a varied one in this Command. It concerned camps with as few as five men as well as cantonment areas with strength figures approaching 10,000. It involved chlorination problems in places where the supply was saturated with natural gas--that could produce a flame at the faucet. It involved hardness problems where heating and power units were faced with heavy carbonate scaling, and reached its ultimate in hardness when wells drilled at Canol Camp produced a total hardness as high as 1,000 parts per million. It had its human element in the line camp where chlorination was frowned upon and every excuse was used to evade the use of hypochlorinators.[8]

In conformance with Chief of Engineers letter to the Service Command Engineer, subject: "Chlorination of Drinking Water Supplies", dated 26 September 1944 and Surgeon General's letter to the Service Command Surgeon, same subject, same date, and in accordance with policy in existance prior to that date, every effort was made to chlorinate all supplies, regardless of source of water.[4] Edmonton (city supply), Skagway (town supply), Dawson Creek and Whitehorse had more elaborate water works including gas chlorination. Other installations in the Command were much smaller in size so hypochlorinators were used excepting where no camp pressure system was possible. In such instances chlorination (sodium or calcium hypochlorite) by hand of the hauled water supply was employed. When water had to be hauled from the best available surface supply a tank, usually of 1,000 gallon capacity, was mounted on a truck and boxed in. Some of these had small heaters built in to avoid freezing when long hauls were involved. Unheated water tank trucks did encounter troublesome icing problems in cold weather. The established policy throughout was to charge the camp foreman or non-commissioned officer in charge of a station with responsibility for maintaining adequate residual chlorine in the water

supply. When the supply was hauled it was required that the chlorine solution be added to the empty tank prior to travel to the watering point. This afforded thorough mixing and added chlorine contact time on the return to camp where residual chlorine checks were made. Chlorine comparators were not available in sufficient number nor were they considered necessary. The attached instructions entitled "Preparation and Use of Water Disinfecting Solutions for Hypochlorinators" was prepared by the author late in 1943, and received distribution thru the various districts of this Command in several, basically unmodified, forms. The individual responsible for chlorination of water at each installation was furnished a copy and a copy was required to be posted alongside each chlorinating unit. This individual was also required to maintain on hand an ample supply of orthotolidine solution for the residual chlorine test. The color test was outlined in the foregoing instructions and was demonstrated and rehearsed repeatedly in the field. In the first aid courses given by the Service Command Surgeon's Office a brief course of instruction was incorporated on the safeguarding of water supplies.[8]

Each installation was required to forward a 150 ml. sample of water in a mailing case to the nearest laboratory once each month for bacteriological analysis. Such laboratories were established at the Station Hospitals in Skagway, Whitehorse and Dawson Creek and at the Norman Wells Dispensary. Excellent cooperation was obtained from Air Transport Command and APO drivers in getting such samples to the laboratory in the shortest possible time. In only a very few instances did more than 48 hours elapse before the samples were planted.[8]

The Commanding General instituted a well construction program for line camps in 1945. An attempt was made to eliminate all hauling of water and install hypochlorinators in all systems. This program was carried over and completed under the Northwest District. The stations in existence at the time of inactivation of the Northwest Service Command and the installations completed prior to transfer from the Northwest District to the Canadian Army include the following, from Edmonton north:[8]

(1) Edmonton

Municipal system from North Saskatchewan River. Treatment consists of chemical coagulation (primarily as a softening process), sedimentation, filtration and chlorination. Plant is operating (1946) approximately 50 per cent over design capacity (4.0 m.g.d.) and City Water Department is endeavoring to obtain funds for new waterworks. Quality of supply has been satisfactory even during peak demand.

Municipality has routine bacteriological and chemical analyses conducted at University of Alberta. Edmonton Station Hospital Laboratory conducts weekly bacteriological analysis of this supply.

(2) Fawcett Repeater Station.
Deep well, chlorination, pressure storage tank.

(3) Wagner Repeater Station.
Deep well, chlorination, pressure storage tank.

(4) Little Smokey Repeater Station.
Two attempts were made to obtain a ground water supply in 1944. Test holes were drilled to a depth of 300 feet. Water is hauled from Little Smokey River, six miles distant, and from shallow well at a farm near Little Smokey River when river supply is turbid. Chlorination by hand, supplemented by use of lyster bags.

(5) Grande Prairie Repeater Station
Town has a normal population of approximately 1,500 supplied entirely from wells without chlorination. Repeater station is fed from town supply. Chlorination of drinking water in lyster bags has been recommended. There have been no records of water borne diseases and samples of raw water submitted to Edmonton Station Hospital laboratory have been repeatedly satisfactory bacteriologically.

Three wells at the Grande Prairie Airbase, one mile out of town, are operated by the Canadian Department of Transport. The Northwest Division installed a 25,000 gallon storage tank and hypochlorinators for this system when U.S. installations were established there in 1943-1944.[8]

(6) Dawson Creek
Dawson Creek waterworks were constructed by the Northwest Division in 1943. Water is obtained from the Kiskatinaw (Cutbank) River 20 miles from town. The treatment comprises sedimentation, pressure filtration and chlorination, with equipment for chemical coagulation which is only required for several weeks in the year. In 1944 the town of Dawson Creek tapped into the Army system and in 1945 the system was turned over to the town when the bulk of the cantonment areas had been evacuated. The Dawson Creek Repeater

Station (Hq. Co. A, 843rd Signal Service Bn.) continues to obtain water from this source.[8]

(7) Kiskatinaw Maintenance Camp, Mile 20 (Note hereinafter mileage numbers indicate distance out of Dawson Creek on Alaska Highway)[8]

This camp hauls water from the town of Dawson Creek. Efforts to obtain a ground water supply at the camp site were unsuccessful.

(8) St. John Ordnance Shops, Mile 49.

This camp area was closed late in 1945. At various times Public Roads Administration, several contractors, Alaska Highway Maintenance, and the overflow of personnel from the Fort St. John Airbase, 6 miles distant, were established here. Four wells on the site supplied all water needs. Raw water samples were consistently good bacteriologically. Chlorination units were never installed.[8]

(9) Charlie Lake Laundry, Mile 53

This installation was turned over to the Alaskan Division, USAAF, in 1945. In 1943 water was obtained from Charlie Lake and from a deep well when both Army and USED operated separate laundries here. The USED Laundry proper was destroyed by fire early in 1944. At that time laundry services were consolidated by the Army and the well supply was used. The system employed an engineer portable filtration and chlorination unit and pressure storage tank.[8]

(10) Blueberry Repeater Station and Blueberry Maintenance Camp, Mile 101, have a joint system including deep well, chlorination and pressure storage.[8]

(11) Sikanni Maintenance Camp, Mile 163, has a deep well, chlorination and elevated storage tank.[8]

(12) Trutch Repeater Station and Trutch Maintenance Camp, Mile 201, have a joint system including deep well, chlorination and pressure storage tank. A little difficulty has been encountered with natural gas but not enough to warrant aeration.[8]

(13) Prophet Maintenance Camp, Mile 245, hauls water (hand chlorination) from a spring several miles south of the camp. A well was constructed in 1945 on the camp site. It is the writer's opinion that faulty construction was responsible

for failure of this well as early tests indicated a satisfactory yield.[8]

(14) Ft. Nelson, Mile 300, included Repeater Station, Ordnance Shops and Maintenance Camps at one time. Quartermaster warehouses were also located here. One well, chlorination and large storage tank comprised the water system for the whole area. The water from this well was frequently inadequate on which occasions the Muskwa River, five miles distant, was used as the auxiliary source of water supply.[8]

Approximately six miles from the Highway the Northwest Division at one time had contractor's employees stationed at the Fort Nelson Air Base. The Division constructed two wells on the base in 1943-1944. Considerable difficulty was experienced with the natural gas. No effort was made to use aeration and/or coke trays for gas removal. Later the Nelson River was used as a source of water supply. Water treatment consisted of chlorination and storage.

(15) Summit Repeater Station and Maintenance Camp, Mile 392
Adjoining Summit Lake was used as a source of water supply. Chlorination and a pressure storage tank make up the system.[8]

(16) Muncho Repeater Station and Maintenance Camp, Mile 456, have joint water system, comprising a deep well, chlorination and storage.[8]

(17) Coal River Repeater Station and Maintenance Camp, Mile 543
Joint water system comprising a deep well, chlorination and storage.[8]

(18) Watson Repeater Station, Mile 635
Has a deep well, without chlorination. Watson Maintenance Camp hauled water (hand chlorination) from a stream at Mile 632. A well was constructed in the Maintenance Camp area but some difficulty was encountered in using this as a source of supply.[8]

(19) Watson Lake Oil Pumping Station
It is located approximately four miles off the highway on the road to the Watson Airbase. This station has a deep well, chlorination and storage.[8]

(20) Swift River Repeater Station, Mile 753

Obtained its water supply from a spring in the camp area. Chlorination and storage were provided. Swift River Maintenance Camp has a deep well, chlorination and pressure storage tank.[8]

(21) Teslin Maintenance Camp, Mile 804

Hauls water from a stream approximately nine miles north of camp. A shallow well was constructed on the camp area adjoining the Nisutlin River but this supply was unsatisfactory.[8]

(22) Brooks Brook Repeater Station, Mile 830

Obtains water from the brook which passes through the camp area. Chlorination and pressure storage are used.[8]

(23) Marsh Lake Maintenance Camp, Mile 883. Obtains water from the lake which adjoins the property. Chlorination and pressure storage tank are provided. An unsuccessful attempt was made to obtain a ground water supply for this camp. The surface supply however continues to be satisfactory.[8]

(24) Macrae Repeater Station, Mile 911.

Was served by the Whitehorse Railroad Depot water System comprising a deep well, chlorination and storage until the Railhead was abandoned. Later it was found more desirable to chlorinate water directly from the Lewes River.[8]

(25) Quartermaster Whitehorse Laundry, Mile 912.

Adjoins the Lewes River. Water was obtained from this source. Chlorination and storage were provided. This laundry was turned over to the Alaskan Division USAAF in 1945.[8]

(26) Whitehorse, Mile 917

The whole Whitehorse Area including Standard Oil, the Air Base, contractor camps and military establishments, were served by the McIntyre Creek. Creek water system included chlorination and storage. At one time the Dowell maintenance Area obtained its supply from the Lewes River. The Air Base had a supplementary well water supply.[8]

(27) Stoney Creek Maintenance Camp, Mile 956

Has a water system comprising a deep well, chlorination and storage.[8]

(28) Canyon Creek Repeater Station, Mile 996

Has a deep well, chlorination and storage. Prior to 1945 water was obtained directly from Canyon Creek, but this supply was troublesome because of extremely high turbidity during spring run off.[8]

(29) Haines Junction Maintenance Camp, Mile 1016

Has a water system comprising a deep well, chlorination and storage. Prior to 1945 water was obtained directly from the Dezadeash River.[8]

(30) Oil Pumping Station "E", Mile 1081

Has a deep well, chlorination and storage.[8]

(31) Destruction Bay Repeater Station and Maintenance Camp, Mile 1083

The Repeater Station has a deep well, chlorination and storage, constructed in 1945. Prior to the construction of this well, water was hauled about 1200 feet from the Maintenance Camp well supply. However the latter was frequently inadequate to meet total demand and Destruction Bay was used as a supplementary supply.[8]

The Maintenance Camp has a well located on the site, in coarse sand, about 100 yards off the bay. This system also employs chlorination.

(32) Koidern Maintenance Camp, Mile 1156

Has a deep well, chlorination and storage.[8]

(33) Koidern River Repeater Station, Mile 1164

Hauls water from the Koidern Maintenance Camp. This camp is located in an area of permafrost which runs to considerable depth. A well was located in this camp but was put out of service either through settling of the building or through shifting of the glacial ice.[8]

(34) Snag Creek Maintenance Camp, Mile 1206

Has a deep well, chlorination and storage. This is the northernmost camp on the Alaska Highway in Canada.[8]

(35) Northway Repeater Station (Alaska), Mile 1265

Hauled water from the well water supply in the Northway Air Base, six miles distant.[8]

(36) Oil Pumping Station "J", Mile 1287
Has a deep well, chlorination and storage.[8]

(37) Cathedral Bluffs Repeater Station, Mile 1345
Has a deep well, chlorination and storage.[8]

(38) Big Delta Repeater Station, Mile 1429
Has a deep well but no chlorination.[8]

PREPARATION AND USE

OF

WATER DISINFECTING SOLUTIONS FOR HYPOCHLORINATORS

1. Mixing Disinfecting Solution:

a. When the water used to dilute or mix disinfecting solution for the Wallace & Tiernan Hypochlorinator contains what is commonly termed "hardness", it will be necessary to observe certain precautions. In order to precipitate as much as possible of this "hardness" previous to the solution passing through the Hypochlorinator, it is advisable that soda ash, or what is more commonly known as washing soda, be added to the disinfecting solution and all precipitate allowed to settle. The amount of soda ash to be added can be determined experimentally by observing the precipitate. A slight excess is not in any way harmful. Certain types of hardness will precipitate without the washing soda.

b. Obviously the solution which passes through the Hypochlorinator must be clear so as not to interfere with the action of the valves. In cases of this kind, therefore, a second crock should be used and the clear solution syphoned over to this second crock from which the Hypochlorinator will draw.

2. Cleaning Hypochlorinator:

a. If difficulty is observed in pumping the solution under circumstances where hard water is known to exist, it is advisable to remove the diaphragm and valves for cleaning. The effects of hard water are indicated by a white coating on all parts in contact with the disinfecting solution. This is most easily removed by soaking the parts in 5 per cent hydrochlorix acid which may be obtained from the District Sanitary Officer at Edmonton Station Hospital. The commercial form of hydrochloric acid, known as muriatic acid, is acceptable (also, initially, vinegar should be tried as a solvent). You are advised not to handle acids for this purpose without the prior knowledge and advise of the Sanitary Officer or his representative, one of whom will endeavor to be present when such cleaning becomes necessary.

3. Clogging of Solution Tube:

a. Regardless of the preparation of the disinfecting solution, when this solution joins the water being treated and that water contains

considerable hardness, there will be a deposit formed inside the silver solution tube used as the connection between the Hypochlorinator and the water main. In time, this will completely plug this tube and the deposit must be removed. Where this condition is known to exist, cleaning of the solution tube should be a routine matter.

4. Adjustment of Chlorine Feed:

a. The amount of chlorine delivered depends on three factors:

(1) The Length of Stroke. This is adjusted by changing the position of the connecting rod (in A-417 series, electrically-operated units) in the curved driving arm. A scale numbered from 1 to 6 is attached to the driving arm. At high speed the pump delivers 60 gals. in 24 hrs. at a setting of 6. The scale is calibrated to read directly on high speed. Thus, at a stroke setting of 4, we get 40 gals. in 24 hrs., and at 2, 20 gals. in 24 hrs.

(2) Frequency of Stroke. At low speed the pump delivers one-sixth as much solution as at high speed. The machine is geared to run at either 2 or 12 strokes per minute. This speed change is controlled by the position of a gear shaft.

(a) To change speed from high to low:

1 Remove the knurled cap on the side of gear case.

2 Remove the "C" washer.

3 Push the shaft further into the gear case with a slow, twirling motion. This will establish a new gear mesh.

4 Put washer into cap.

5 Replace cap. The new position of the washer maintains the shaft in its imposition for low speed.

(b) To change speed from low to high, reverse the above procedure.

(3) Strength of Solution. The maximum strength chlorine solution that may be used is 1 per cent available chlorine. If 1 per cent is used, the machine will deliver 5 lbs. in 24 hrs., at high speed on stroke setting of 6. Sixty gallons of 1 per cent chlorine solution contains 5 lbs. chlorine. By proper adjustment of the strength of solution, the desired chlorine feed can be accomplished with a convenient quantity of solution. Thus, if 40 gals. of 1/4 per cent solution were desired amount, the same results could be achieved with 20 gals. of 1/2 per cent solution. It is recommended that HTH or Perchloron be used for preparing the solution. If the solution becomes cloudy upon addition of the chemical to the water, allow it to settle until it becomes clear. However, it must be borne in mind that the mixture must be stirred for a long period of time (20 min.) before a fairly completed solution is obtained. After settling the clear fluid can then be syphoned into the crock in use as a solution reservoir.

5. Dosage and Residual Chlorine.

a. With a pumpage of 15,000 gallons a day, it is recommended that a minimum trial dosage of 1.5 parts per million of chlorine be applied. This would amount to slightly less than 1/5 lb. of chlorine per day. It is further recommended that this be prepared initially as an 0.5 per cent solution, i.e., the 0.2 lbs. of chlorine would be dissolved in about 5 gallons of softened water. The hypochlorinator would then be adjusted so that 5 gallons of this 0.5 per cent solution are fed into the supply in 24 hours.

b. It must be realized at all times that the required dosage necessary to properly safeguard the water can only be determined when the water is ready to be consumed, i.e., at a water tap in the camp. Increase or decrease the strength of chlorine solution until it is found that a residual chlorine reading of 0.4 p.p.m. is obtained at the point of consumption a minimum of 1/2 hour after the chlorine dosage has been applied. Tests should be made at least once daily to assure proper amount of residual chlorine.

6. Test for Residual Chlorine.

a. In testing for residual chlorine (without a chlorine comparator), place about an inch of water in a clear drinking glass. Add 15 drops

of orthotolidine testing solution and, if the water is very cold, warm the glass by holding in the hands for 5 minutes. Observe maximum color developed in the 5 minute interval.

b. A deep yellow or canary yellow color is an index of proper protection to the water. It is then ready for distribution and use.

The absence of color or the development of only a pale yellow color indicates incomplete disinfection of the water. It is not properly safe-guarded. Follow the chlorinating instructions for adding additions chlorine and retesting until a canary yellow color is obtained.

The development of a red or orange-red color in the test indicates an overdose of chlorine. If such a condition develops, it is reasonable to estimate that about twice as much chlorine was added as would be required. Reduce the dosage accordingly for the next tank full and adjust dosages and retest until the proper canary yellow color develops.

SPMDS 720 2-1 (Northwest Service Command) AA

ARMY SERVICE FORCES
Office of The Surgeon General
Washington 25, D. C.

18 March 1944.

SUBJECT: Sanitary Surveys of Water Supply Installations in accordance with AR 40-205.

TO: Commanding General
Northwest Service Command
APO 702
Minneapolis, Minnesota
(ATTENTION: THE SURGEON)

1. Par. 11a (3), AR 40-205, requires the Medical Department to make periodic and special sanitary surveys of all existing water supply installations, including sources of supply and all measures for purification, and to submit recommendations for corrections of sanitary defects.

2. Surveys of this nature, to be of any value, should be made by competent and experienced sanitary engineers. An outline, indicating the factors to be covered, is attached.

3. It is requested that a program of sanitary surveys be initiated in your theatre, in accordance with AR 40-205, to determine hazards now existing in water supply installations. The survey should be made in cooperation with the Post Engineer; correction of hazards should be accomplished by local action to the maximum extent. Reports and recommendations should be forwarded to The Surgeon General through channels.

For Lieutenant General SOMMERVELL

NORMAN T. KIRK,
Major General, U. S. Army,
The Surgeon General.

/s/ ROBERT J. CARPENTER,
Lieut. Colonel, Medical Corps,
Executive Officer.

OUTLINE FOR SANITARY SURVEY OF WATER SUPPLY INSTALLATIONS.
(Par. 11a (3), AR 40-205)

1. Name and general location of post.

2. Water quantity used, in million gallons per day (monthly average or for a representative day).

3. Supply Source of Water:
   a. Type of source of supply (well, river, or purchased from whom) and adequacy.

   b. Describe the source of supply, including factors tending to cause contamination. Include data on the quality of water, as analyses.

4. Treatment Plant and Methods:
   a. Description of water treatment methods (not including chlorination facilities) with size, design capacity and operation rates for all units of the treatment plant.

   b. Chemicals used (not including chlorine), their points of application, and dosage in grains per gallon or parts per million.

   c. Chlorine dosage, point of application, contact period before water is used, and residual at one or more points of use.

   d. Bacteriological and chemical analyses of the treated water, if available.

5. Distribution System or Methods:
   a. Description of water distribution system, with data on adequacy and kind of piping, pressures and continuity of service.

   b. Cross-connections, including (1) direct connections with other sources of water supply and water distributing systems, with data on the quality of water in each cross-connected source or system; (2) unprotected plumbing fixtures liable to permit backflow; (3) swimming pools; and (4) other devices, such as sewage pumps.

6. Medical Department Supervision:
   a. Laboratory facilities, including their type; name, location and distance; frequency of testing, especially for chlorine residual; and tests normally run. (Par. 11b (4) (a), AR 40-205)

   b. Inspections by Medical Department personnel, with data as to type and frequency.

   c. Supervision of operation by Medical Department personnel, and degree of cooperation with Corps of Engineers operating personnel.

7. Recommendations:
   a. General.
   b. For correction of specific sanitary defects found.

ARMY SERVICE FORCES
Headquarters Northwest Service Command
APO 722, Edmonton, Alberta

Refer to File No. SPNSM 31 March 44

Special Sanitary Surveys of Water Supply Installations in Accordance with AR 40-205.

Commanding Officer, Each District. ATTN: District Surgeon.

1. Par 11a (3), AR 40-205, requires the Medical Department to make periodic and special sanitary surveys of all existing water supply installations, including sources of supply and all measures for purification, and to submit recommendations for corrections of sanitary defects.

2. The survey should be made by the District Sanitary Officer. An outline, indicating the factors to be covered, is attached.

3. It is requested that a program of sanitary surveys be initiated in your district, in accordance with AR 40-205, to determine hazards now existing in water supply installations. The survey should be accomplished by local action to the maximum extent. Reports and recommendations should be forwarded to The Surgeon General through channels. HAB EMS

By command of Brigadier General WORSHAM: CSS

CHARLES R. MUELLER FTM
Colonel MC
Chief of Medical Branch

1 Incl - Outline for Sanitary Survey, Water Supply Installations CRM

cc - Surgeon, Wing Hq. Sta No 1, ATC
APO 462, U. S. Army

OUTLINE FOR SANITARY SURVEY OF WATER SUPPLY INSTALLATIONS
(Par. 11a (3), AR 40-205)

1. Name and general location of post.

2. Water quantity used, in million gallons per day (monthly average or for a representative day).

3. Supply Source of Water:
   a. Type of source of supply (well, river, or purchased from whom) and adequacy.

   b. Describe the source of supply, including factors tending to cause contamination. Include data on the quality of water, as analyses.

4. Treatment Plant and Methods:
   a. Description of water treatment methods (not including chlorination facilities) with size, design capacity and operation rates for all units of the treatment plant.

   b. Chemicals used (not including chlorine), their points of application, and dosage in grains per gallon or parts per million.

   c. Chlorine dosage, point of application, contact period before water is used, and residual at one or more points of use.

   d. Bacteriological and chemical analyses of the treated water, if available.

5. Distribution System or Methods:
   a. Description of water distribution system, with data on adequacy and kind of piping, pressures and continuity of service.

   b. Cross-connections, including (1) direct connections with other sources of water supply and water distributing systems, with data on the quality of water in each cross-connected source or system; (2) unprotected plumbing fixtures liable to permit backflow; (3) swimming pools; and (4) other devices, such as sewage pumps.

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   a. Laboratory facilities, including their type; name, location and distance; frequency of testing, especially for chlorine residual; and tests normally run. (Par. 11b (4) (a), AR 40-205)

   b. Inspections by Medical Department personnel, with data as to type and frequency.

   c. Supervision of operation by Medical Department personnel, and degree of cooperation with Corps of Engineers operating personnel.

7. Recommendations:
   a. General.
   b. For correction of specific sanitary defects found.

SPNSE

2 May 1944

Water Supply Investigation along Canol Road.

Lt. Sorbel

Col. Kirkpatrick

(Through: Engineering)

1. During the interim from 19 April 1944 to 29 April 1944 the writer investigated the water supplies from Norman Wells to Johnson's Crossing; along the Canol Road. The purpose of the investigation was to determine whether the supplies were safe for human consumption; and if questionable recommend treatment necessary to insure the supplies against pathogenic organisms. Recommendations were made at the time of inspection to the Camp Superintendants and/or time-keepers. The same recommendations were made to the Sanitary Officer at Whitehorse so that he could follow up.

2. NORMAN WELLS. Water for this Camp is, at the present time obtained from the Mackenzie River. Before the water is delivered to the consumer it is filtered and chlorinated; this treatment is adequate to produce a safe supply. During the spring break up of the Mackenzie River it is planned to delete this source and obtain water from Bosworth Creek.

It has been recommended that chemical coagulation and sedimentation basin be added to this system. The writer does not concur with the recommendation because it is doubtful if the quality of the water will be improved sufficiently to warrant the expense. In order to coagulate this water it would be necessary to add chemical feeding equipment; a flash mixer; a flocculation chamber and a sedimentation basin.

It is the opinion of the writer that with the present treatment, i.e. filtration and chlorination, a safe supply is maintained.

3. BEAR ISLAND. An Army Portable Water Treatment Plant is used at this base to process Mackenzie River water. The treatment will consist of the addition of Sodium Aluminate and, if needed, Soda Ash; filtration and chlorination. With this treatment a safe water supply can be maintained at this camp.

The writer spent the afternnon of 20 April 1944 training an operator for this plant.

It was recommended that the cross-connection between the raw water and the finished water be corrected by the addition of a Union in the pipe line in question. This union should be left broken.

4. CANOL. The raw water for Camp Canol is hauled from the Mackenzie River, 5 miles distant, to the camp area where it is filtered and chlorinated. With this treatment the water is safe for human consumption. The water consumption at this camp is about 25,500 imperial gallons per day. It is estimated that, at ten cents per ton mile, it costs approximately $23,000.00 per year to supply water to this camp.

In order to save the pumping station at the Mackenzie River, during the Spring run off, a new source must be located. There are three possible sources, namely; Canol Lake, 3 miles distant; Heart Lake, 5 miles distant; and a drilled well. The water from both Canol and Heart Lakes is muskeg water and, therefore, of poor quality. Water from these two sources will involve the big expense of hauling. It is recommended that the camp area be prospected for a ground water supply. The necessary drilling equipment is on the grounds. Information received from the oil well drillers was to the effect that there is about 100 ft. of permafrost and that water bearing sands may be encountered at about 125 ft. If a ground supply can be located the expense of hauling would be eliminated.

5.

Station No.	Source of Water Supply	Treatment	Remarks
Station 36 - Pump Station No. 2	Side Stream Flowing Into Dodo Creek	Not Chlorinated	This supply must be considered potentially dangerous as it is a surface supply and there is a danger of it being post contaminated in handling. It was recommended that this supply be hand chlorinated. With a residue chlorine of 0.4 ppm this supply will be safe for human consumption. This water is used by both military and civilian personnel.

Station No.	Source of Water Supply	Treatment	Remarks
Camp 50, Maintenance Camp; elliott	From Keel River	Not Chlorinated	Recommended Hand Chlorination for same reason as stated above.
Camp 76 - Pump Station No. 3	From Keele River	At times Chlorine is used.	Recommend continual Hand Chlorination by first Aid Man.
Camp 82	From Keele River	At times Chlorine is used.	Recommend continual Hand Chlorination by First Aid Man.
Camp 102	From Carcajou River	Hand Chlorinated with H.T.H.	Water Supply Safe when Chlorinated.
Camp 111E Pump Station 4.	Obtain water from Camp 102	Same as 102	Same as 102
Camp 134	Obtain water from Twityo River	Do not chlorinate.	Supply must be considered potentially dangerous without chlorination. Camp Hasson, Whitehorse, was instructed to send chlorine to this camp along with instructions in chlorinating.
Camp 143	Godling Creek	Chlorinated	Safe so long as Chlorination is employed.
Camp 151	From Nearby Glacieral Stream.	Not Chlorinated.	Recommended chlorination to safe-guard the water against Post contamination. Instructed San. Corps Officer at Whitehorse, Y. T. to send chlorine to this camp.

Station No.	Source of Water Supply	Treatment	Remarks
Camp 174	From Sekwi River	Not Chlorinated.	Instructed Aid Man to Hand Chlorinate this supply.
Camp 176	From Sekwi River	Not Chlorinated.	Advised Camp Supt. to contact Aid Man from Camp 174 and have him chlorinate this supply.
Camp 183	From Sekwi River	Not Chlorinated.	Recommend Hand Chlorination. Instructed San Corps Officer at Whitehorse to send Chlorine to this camp.
Camp 213 Pump Station 6	From Sekwi Creek	Not Chlorinated	Same as Camp 183
Camp 268 (From Johnson Crossing)	From Macmillan River	Not Chlorinated	Same as Camp 213
Camp 228 (From Johnson Crossing)	From South Fork	Chlorinated	Safe so long as chlorination is employed.
Camp 202 (Johnson Crossing)	From nearby Creek	None	Recommend Hand Chlorination. At present time Camp has a population of only three men.
Camp 177 (Johnson Crossing)	Creek 1 Mi. North of Camp	None	Recommend Hand Chlorination. Instructed Sn. C. officer at Whitehorse to send Chlorine to this camp.
Camp 141 (Johnson Crossing)	From Ross River	Chlorinated	This supply is safe so long as it is chlorinated.

Station No.	Source of Water Supply	Treatment	Remarks
Camp 127 (Johnson Crossing)	From Pelle River	Not chlorinated at present	Approximately 2 weeks before the time of inspection the pumphouse burned down. As a result of this fire the hypochlorinator was damaged beyond repair. The writer instructed the first aid man to hand chlorinate until such time as a new hypochlorinator was installed. The Sanitary Officer at Whitehorse was instructed to send a hypochlorinator to this camp immediately. This water without chlorination is potentially dangerous because of the Indian inhabitants living on the water shed.
Camp 78 (Johnson Crossing)	Adjacent	Not Chlorinated.	Recommend Hypochlorinator be installed on this system. Also recommended that the intake be moved about 500 ft. upstream because with the present arrangement surface drainage from the camp area is likely to find its way into this supply. With chlorination this supply will be safe for human consumption.
Camp 24 (Johnson Crossing)	Haul Water from Johnson Crossing	Chlorinated	This water supply is safe for human consumption so long as it is chlorinated. The water from Johnson Crossing is chlorinated and is safe for domestic purposes.
Johnson Crossing	Teslin River	Chlorinated	This water supply is safe

6. It is doubtful if the water (for the camps along the Canol road) as it comes from the glaciers and streams contains pathogenic organisms. However, where it is being handled several times before it is dispensed, there is a danger of post contamination. Chlorination will, if the proper residual is maintained, protect the supplies against post contamination. It is recommended that a metal disc be welded on the end of all truck pump hoses.

ARMY SERVICE FORCES
Northwest Service Command
Office of the District Surgeon
APO 724, Minneapolis, Minnesota

22 May 1944

SPDSM

SUBJECT: Special Sanitary Report on Water Supplies in the Dawson Creek District.

TO: The Surgeon General, Washington, D.C. (THRU: The Commanding Officer, Northwest Service Command, APO 722, Minneapolis, Minnesota, THRU: The District Commander, APO 724, Minneapolis, Minnesota.

Pursuant to the provisions of par. 11-a (3) AR 40-205 and letter directive, Northwest Service Command, File SPNSM, Subject: "Special Sanitary Surveys of Water Supply Installations in accordance with AR 40-205", dated 31 March 1944, the inclosed Special Sanitary Report on Water Supplies is submitted:

For the District Surgeon:

/s/ Frank G. Manning
FRANK G. MANNING
1st Lt, SnC
District Sanitary Officer

I

Water Supply for Dawson Creek Area

1. Name and general location of Post: Dawson Creek, B.C., Canada. This Army water works supplies the Post of Dawson Creek, the Canadian Village of Dawson Creek, the Camp of the Engineer Division Office, and Utility Camp No. 29. In addition to these, water is hauled to the Bates and Rogers Camp and to Heavy Duty Camp No. 3 in the Dawson Creek area and to the Highway Maintenance Camp at M-20.

2. Water quantity used: Present average consumption is 0.2 million gallons a day.

3. Supply source of water:

a. Type and adequacy. An adequate supply is obtained throughout the year from the Cutbank River.

b. Distribution of source of supply, including continuation sources, quality and analyses of water. Virgin lands make up practically all the drainage basin for the Cutbank River above the intake location. There are no settlements of any consequence that might cause a source of pollution. Chemical and physical qualities of the raw water fluctuate widely throughout the year. In the winter months chlorination only is at times satisfactory. At the present time color of raw water runs about 60, turbidity 120, total solids 330, alkalinity 125, total hardness 200 and iron 5 parts per million. The hydrogenion concentration of raw water is about 7.6. A good quality, but fairly hard finished water is obtained throughout the year.

4. Treatment plant and methods:

a. Description of water treatment methods. Water is pumped from the intake wet well at the Cutbank 10.2 miles of the treatment plant site at an average rate of 0.2 m.g.d. The treatment plant consists of rapid and slow coagulation basins, a sedimentation basin and 2 one million gallon storage reservoirs. These units were planned for a 0.25 m.g.d. capacity and are now functioning at that rate by so scheduling the pumping cycle. The chemically treated and filtered water flows by gravity an additional 1.4 miles to a booster station at the Post of Dawson Creek. At the booster station it is filtered through 2 horizontal pressure type sand filters prior to distribution. The filtration rate varies widely as follows:

(1) Throughout the day filtered water for all parts of the system other than the Post reaches the booster station without further pumping and at a pressure of approximately 40 pounds per square inch.

(2) For approximately 7 hours a day filtered water is pumped to a one million gallon reservoir that "floats on the line" in the Post area. For the balance of the day all water for the Post area is supplied for this reservoir.

(3) An estimated 0.05 m.g.d is consumed in the Post area.

b. Chemicals used, point of application, and dosage. Filter alum is the only coagulant required at the present time. Occasionally when insufficient alkalinity is present this is augmented with lime. Soda ash was not found to be as satisfactory as lime. For several months during the winter, coagulation is not required. Coagulants are introduced in the entrance to the treatment plant ahead of all sedimentation and storage 1.4 miles above the entrance to the filters and distribution system. At the present time the Post Engineer reports an alum dosage of 8 grains per gallon. It is believed that the installation of recently received laboratory equipment and a flow meter will permit closer control of chemical dosages.

c. Chlorine dosage, point of application, contact period and residual chlorine. The chlorine dosage averages 4 parts per million, but is varied with the working of the booster pumps. It has been applied at the filters in the booster station. The dosage and contract period can vary from one half hour to (theoretically) 5 days, since a one million gallon reservoir "floats on the line". Residual chlorine is 0.4 parts per million half hours after dosage and 0.1 parts per million for reservoir water which had had longer period of contact. This is checked daily at several points in the system and also during changes in pumping cycles.

d. Bacteriological and chemical analyses of finished water. Bacteriologically potable with no coli aerogenes organisms indicated. No recently completed chemical analyses are available.

5. Distribution system and methods.

a. Description of water distribution system. The distribution system consists of steel, iron and transite pipes in various parts of the system. Pressure varies from 78 to 98 pounds. In the low and high pressure areas the system serves the Post of Dawson Creek, the Village of Dawson Creek, the Engineer Division Camp and Utility Camp

No. 29. There are occasional breaks in the water main primarily in the area between the Post and Village of Dawson Creek. However, on the whole continuity of service is good and the system is considered adequate.

b. Cross Connections.

(1) No cross connections with other sources of water supply.

(2) No unprotected plumbing fixtures to permit back flow, with the possible exception of a few in the Village of Dawson Creek, which may have been overlooked.

(3) No swimming pools in this locality.

(4) No sewage pumps or other devices which might afford sources of contamination.

6. Medical Department Supervision:

a. Within the past month supplies have been received in the Station Hospital Laboratory for the conduct of routine bacteriological and more common chemical analyses. It is planned in the near future to establish laboratory control equipment at the treatment plant for the purpose of more closely controlling the chemical dosages. Chlorine residual tests are run by the plant operators and by the District Sanitary Officer several times throughout the day. Rough approximations by jar tests are also conducted by the plant operator in regulating the chemical dosages.

b. Inspections by Medical Department personnel. Monthly inspections are made of the treatment plant and booster station, including chlorination apparatus, by the District Sanitary Officer.

c. Supervision of operation by the Medical Department. The Medical Department, through the District Sanitary Officer, maintains close and constant contact with the Post Engineer and staff in matters concerning the proper operation of the water works.

7. Recommendations:

a. General. If it is expected that the works will be part of a permanent installation, it is recommended that an ammonia feed

apparatus be installed in the treatment plant and that chlorine and ammonia be applied at this location subsequent to sedimentation. When lime is used as a coagulant it would also be advisable to provide for the solution feed of calgon (sodium hexametophosphate). This would result in an appreciable saving in chlorine and would also serve as a check against intensive scaling of heating units when overdoses of lime have been applied.

b. For correction of sanitary defects. The present method of chlorination is not considered most economic for this type of installation. However, the method does provide for sufficient chlorine dosages to assure a properly safe-guarded supply at all times.

II

Summary of survey of water facilities in line camps in the Dawson Creek District.

1. There are well water supplies for the following camps:

a. M-49, M101, M-201, M-278, M-300, M-375 and M-454. There are surface water supplies in nearby streams at M-308, some at Station M-382, and M-423.

2. The number of employees in these camps varies, at the present time, between 3 and 97, with an average of only 26 persons per camp. The water consumption has been less than 50 gallons per capita per day in these establishments.

3. a. The water supplies, both ground and surface, are considered both adequate and satisfactory under present conditions.

b. None of these sources of supplies are directly exposed to any source of contamination. However, it has been the policy and objective in the District to endeavor to provide chlorinating facilities for all water supplies regardless of source. A first aid man is stationed at each of the larger establishments, viz; M-49, Blueberry, Trutch, Nelson and M-454. Samples of water are submitted weekly to the Commanding Headquarters Laboratory for bacteriological analysis by the first aid man in each of these establishments. The Sanitary Officer collects samples at least once monthly at each of the small camps. Residual chlorine readings are made in every camp at least once each day and a residual 0.4 p.p.m. of chlorine is required at the tap in each camp.

4. Each of these camps has an untreated supply other than chlorination with the following exceptions:

a. Camp M-308 is equipped with an Army type portable purification unit, consisting of chlorination and filtration. A similar unit is about to be installed in Summit Station water system. Both of these are surface water supplies.

b. At the present time chemicals are not used as coagulants in any of the water systems other than at Dawson Creek Post.

c. Sodium hypochlorite is used extensively for chlorination of all water supplies in line camps. Detailed instructions have been issued, and demonstrations and inspections have been made by the District Sanitary Officer to assure a sufficient chlorine dosage in each supply to meet all requirements of Army Regulations.

d. Results of all tests to date indicate that all of the water supplies now in use are potable bacteriologically. For the small line camps it was not considered necessary to submit samples for chemical analysis.

5. a. Distribution systems in all of our line establishments consist primarily of elevated storage tanks and small cast iron pipe lines to mess halls, wash and shower rooms. In some of the larger establishments, such as St. John Area Camp, (M-39/, Blueberry, Trutch, Camps M-300, M-308 and M-454,) permanent plumbing fixtures have also been installed in barracks buildings so that running water is available at all times.

b. No cross connections with any other water supply, or distribution system, are involved under these conditions. No plumbing fixtures, sewage disposals, or other devices are installed in any system connected with the water distribution system in these establishments in such a way as to constitute a source of contamination to the water supply.

6. a. No laboratory facilities are available in the Dawson Creek District other than at the Station Hospital. It has been the practice in line camps to forward water samples to the nearest air base and have these flown to the Station Hospital Laboratory in Edmonton. In the future, samples taken from camps within shorter travel distance to Dawson Creek will be analyzed by the District Sanitary Officer at the Station Hospital Laboratory, Dawson Creek, as well as maintaining sporadic duplicate checks through the Command laboratory.

b. Chlorine residual tests are conducted at least once daily by responsible parties trained in this work by the Sanitary Officer.

c. All water systems, methods of analyses, and methods of dosing and storage of water, are inspected in detail at least once monthly by the Sanitary Officer.

d. The District Sanitary Officer arranges for whatever extensions and corrections to the water system as are required when determined in the course of his inspections. Close cooperation has been maintained with the Corps of Engineers operating personnel at all times.

7. Recommendations:

a. Two hypochlorinators and a pressure type detention tank are required for the proper safeguarding of the well water supply at Camp M-49.

b. Hypochlorinators are required for installation in the water systems at Camps M-101 and M-454.

c. A hypochlorinator is on hand at Trutch well pumphouse. It is recommended that this be installed as quickly as the skilled labor is available.

d. Other deficiencies in the water systems in this District, such as the temporary lack of water purification units at Summit Station, are being corrected through the cooperation of responsible local authorities.

SPDVG 1st Ind. (22 May 1944) AR/jak
ASF, NWSC, District Headquarters, APO 724, c-o Postmaster, Minneapolis, Minnesota, 20 June 1944.

TO: Commanding Officer, Northwest Service Command, APO 722, Minneapolis, Minnesota.

Following comments and recommendations are submitted in connection with the attached Sanitary Report:

a. Paragraph 7, Section I: Recommend an ammonia feed apparatus be installed in the treatment plant at the Dawson Creek water works. Such equipment is not on hand at this station. Request authority be granted this Headquarters to requisition the required equipment.

b. Paragraph 7, Section II: Hypochlorinator has been installed for the water system at Camp M-454. A water purification unit has been installed at Summit station. Other installations, as outlined, are to be made as soon as skilled labor for that type of work is available. Although Camp M-49 is no longer under the jurisdiction of this headquarters, the installation will be completed by this District. All material and equipment required for said installations have been requisitioned.

/s/ G. R. TYLER
G. R. TYLER
Colonel, CE,
Commanding

721.5(DC)4 2nd Ind. (22 May 44) SPNSM

ASF, Hqs., NORTHWEST SERVICE COMMAND, AND OFFICE OF THE DIVISION ENGINEER, EDMONTON, ALBERTA, CANADA, 4 July 1944.

TO: Commanding Officer, DAWSON CREEK DISTRICT, U. S. ARMY, DAWSON CREEK, BRITISH COLUMBIA.

1. Installation of ammonia feed apparatus referred to in Paragraph 7, Section I of basic communication and Paragraph a, of 1st Indorsement, is not considered necessary nor economically justified for a temporary installation of this nature. The basic communication indicates that a safe potable water is being produced and the required chlorine residual is being maintained.

2. The use of calgon (sodium hexametaphosphate) as recommended in Paragraph 7, Section I, of basic report is not considered advisable. It is believed that the production of scale in heating units can be reduced to a minimum through proper control of coagulating

agents. The use of calgon in water systems, without close laboratory control might prove to be more harmful to equipment, due to corrosive action, than would carbonate deposits.

For the Commanding Officer:

CHARLES R. MUELLER
Colonel, MC
Chief, Medical Branch

MEM/ms
RLR
CSS
CRM

3rd Ind.
ASF, NWSC, Hq. DAWSON CREEK DISTRICT, U.S. ARMY, DAWSON CREEK, B.C.
25 July 1944.

To: Commanding Officer, NORTHWEST SERVICE COMMAND, U. S. ARMY, EDMONTON, ALBERTA, CANADA

1. Reference is made to paragraph 1 and 2 of 2nd Ind. The refinements recommended in paragraph 7a, Section 1, basic report, were only on basis of a permanent installation and would not be necessary in the temporary installation, excepting that close control of lime feed cannot be maintained with equipment on hand. Lime is not used extensively at the present time; the use of calgon, therefore, is not a necessity in the temporary installation intended.

2. Recommendations indicated in paragraph 7, Section II of basic report are to be complied with as reported in part b of 1st Ind.

CURTIS A. STONE
Major QMD
Commanding

721.5(DC)4 4th Ind. (22 May 44) SPNSM

ASF, Hqs., NORTHWEST SERVICE COMMAND AND OFFICE OF THE DIVISION ENGINEER, APO 722, MINNEAPOLIS, MINNESOTA, 31 July 1944.

TO: The Surgeon General, Office of the Surgeon General, Washington 25, D.C.

C.R.M.

MEM/ms
RLR
CRM

DIVISION ENGINEER
NORTHWEST DIVISION

M E M O R A N D U M

(For inter-office use only)

FILE NO SPNSM DATE: 29 June 1944.

SUBJECT: Special Sanitary Report on Water Supplies in Dawson Creek Dist.

FROM: Medical Branch TO: Engineering Branch
(Attn: Lt. Sorbel)

Request pertinent comment, by indorsement on this memorandum, on so much of Par. 7, Sect. I, of basic report pertaining to use of calgon (sodium hexametaphosphate), and Par. 1 of 1st Indorsement regarding installation of ammonia feed apparatus.

/s/ MORGAN
MORGAN

1 Enclosure:
Cy of Sanitary Report.

SPNSE
Engineering Branch

1st Memo. Ind.
to

3 July 1944.
Medical Branch
(Attention: Lt. Morgan)

1. Inasmuch as the basic report indicates that a safe potable water is being produced and the required chlorine residual is being maintained, it is not considered that the installation of an ammonia feed apparatus is necessary or economically justified for a temporary installation of this nature.

2. It is believed that the production of scale in heating units can be reduced to a minimum through proper control of coagulating agents. The use of Calgon in water systems, without close laboratory control, might prove to be more harmful to equipment, due to corrosive action, than would carbonate deposits. The use of this type of treatment is not recommended.

LOVITT

Incl. w/d

SUPPLEMENT NO. 1

ARMY SERVICE FORCES
Northwest Service Command
Headquarters, Whitehorse District
Whitehorse, Y.T., Canada

SPWSM 27 May 1944

SUBJECT: Water Supply Installations, Fairbanks, Alaska

TO: File (Medical Branch)

1. Inspections of the water supplies used by District installations in Fairbanks were made 18 May 1944, in company with a representative of the Repairs and Utilities Branch. There were four main sources of supply. District Headquarters, Zehnder Camp, Slater Camp, the staff House, and Motor Pool Garage (comprising about 600 persons)-were supplied with water purchased from the Fairbanks Exploration Co., a privately-owned enterprise. The former CCC camp, occupied by about 68 men from SU 2450, the Canol Camp, having about 50 persons, and the Base Camp, comprising about 200 persons, were supplied by District operated wells. Water samples were collected for bacteriological examination at the time of the inspection. Each water supply is discussed separately below.

a. Fairbanks Exploration Company Supply. This water supply consisted of one dug well, one drilled well in an open pit subject to surface contamination, and three housed drilled wells. The dug well, which was the source usually available to the District, was 20 feet deep, 8 feet square for the upper 12 feet, and 4 feet in diameter for the lower 8 feet. The upper portion consisted of tight fitting wood sheeting. The lower portion consisted of steel sheeting. From information available, the drilled wells were approximately 60 to 100 feet deep, and were cased for the entire depth. All the wells were connected to a common header, making possible the use of any well or combination of wells. Water from the dug well was pumped by a 275 GFM centrifugal pump into the distribution system, consisting of 3- and 4-inch steel lines, and into a float controlled elevated 5000-gallon housed steel tank floating on the line. The wells were

located within 50 to several hundred feet from sewers and cess pools. A steam line ran parallel to the water line to prevent freezing. Although recommendations for chlorination of this supply had been made previously by Malcolm Pirnie, Jr., USPHS, 14 May 1943, and by Captain Bogart, Sanitary Officer, this had not been accomplished. The general superintendent of the Fairbanks Exploration Company refused to chlorinate the water supply, and would not permit chlorination of water available to the company. Therefore, unless the Fairbanks Exploration Company could be persuaded to take action, it would be necessary to install three or four proportional feed chlorinators, one on each main leading to camp area, to protect the district water supply. Routine samples for bacteriological examination were collected in the past, and available reports showed the absence of coliform bacteria in the dilutions examined. The water had an unpleasant ordor, appearance, and taste, probably due to the iron bacteria, cronothrix, which grew in abundance in the dug well. Reports on complete chemical and microscopic examination of the water were not available, and facilities for such examinations were not to be found locally. This is a poor water supply; however, it is believed that it can be improved by chlorination and the application of copper sulphate, activated carbon, coagulation and filtration, or a combination of such accepted practice.

b. SU 2450 Water Supply. This was an old CCC camp water supply. Details of its construction were not known or available in the Post Engineer's files. The well, apparently a driven point, was located beneath the orderly room floor. Water was obtained from the well by a shallow well reciprocating pump, and was pumped through a pressure tank to the distribution system. The water was clear, colorless, and attractive, except for a slight mineral taste. Samples for bacteriological examination collected in the past showed the absence of coliform bacteria; hence, the water was considered safe to drink. There were no known sources of sewage pollution in the immediate vicinity.

c. Canol Camp Water Supply. The status of this camp was in doubt at the time of the inspection. It appeared that this camp would be taken over by the Air Base. In any case, the water supply consisted of a capped drilled well, 6 inches in diameter and probably 100 feet deep. Water was pumped

out of the well by means of a turbine pump, through a pressure tank and into the distribution system. Water, sewer, steam, condensate and recirculating lines all ran in a shallow wooden box to prevent freezing of lines. The sewer line ran below all others. There were no known possible sources of sewage pollution, except a wire wound wood stave sewer which passed within about 200 feet of the well, and a gravel borrow pit receiving sewage, located about 1000 feet from the well. This water was cold, clear, colorless and attractive except for a slight mineral taste. Reports on samples collected for bacteriological examination during the past few months showed the absence of coliform bacteria.

d. Base Camp Water Supply. This installation is located just off the Richardson Highway, about 6 miles south of Fairbanks. The water supply consisted of the two 6-inch drilled wells approximately 100 feet deep. Each well was rated at 60 gallons per minute. One well was being repaired at the time of inspection. The other well was equipped with an automatic electrically driven turbine pump. All water pumped was chlorinated by means of an electrically operated Wallace and Tiernan hypochlorinator as it entered a 1000-gallon steel pressure tank. Working pressure was maintained between 40 and 50 pounds per square inch. The water was distributed through a 4-inch steel distribution system housed in a wooden box, together with sewer, steam, condensate and pump return lines. The sewer line, a 6-inch wire wound wood stave pipe, was approximately 2 feet below the welded steel water main. This combination of pipes passed within 100 feet of the well; however, it was considered of no particular health significance. A satisfactory residual chlorine was found in the water at the time of two visits to the camp. Laboratory reports on this new water supply were not available.

2. Recommendations. Improvement in operation and control, where indicated in the water supplies discussed above, is to a very large extent dependent upon local conditions and the duration of supervision by this command. The following is considered fundamental and essential for proper sanitary control.

a. Fairbanks Exploration Company Water Supply. Inasmuch as the District water supply is obtained from a shallow dug well, and since this supply is cross-connected with an open drilled well located in an open pit collecting surface water and ground water, all water available from this source should be adequately chlorinated, as has been previously recommended.

b. The collection of routine water samples for bacteriological examination at least monthly from the District CCC camp, Canol Camp, and the Base Camp should be continued. This will be accomplished by the Sanitary Officer at the time of his periodic visits.

Joseph A. Salvato, Jr.
Captain, Sanitary Corps

Approved:

WILLARD V. ERGENBRIGHT
Captain, Medical Corps
District Surgeon

SPESM

Subject: Special Sanitary Survey of Water Supply Installations.

To: Surgeon General
Through: Commanding General, NWSC, APO 722, MPLS., Minn.
Through: District Commander, APO 722, Mpls., Minn.

Pursuant to the provisions of paragraph 11a (3), AR 40-205, and letter directive NWSC file SPNSM, subject: Special Sanitary Surveys of Water Supply Installations in accordance with AR 40-205, the following report is submitted:

Norman Wells

1. This camp is located on the bank of the MacKenzie River in the Northwest Territory, Canada.

2. An average of 31,000 gallons of water are used daily.

3. Source of Supply:

a. During the winter months when the MacKenzie River is frozen, water is pumped from under the ice. During the spring break-up and throughout the following season when the river becomes very turbid, water is pumped from Bosworth Creek which flows into the MacKenzie River near the camp.

b. There are no factors that tend to cause contamination of either of these sources. The camp is located downstream from the intake on both the river and the creek. The water from the MacKenzie is of good quality during the winter months and that from Bosworth Creek is of good quality the year round. Neither water contains any injurious chemical contaminates. Both are low in chlorides and sulfates. Neither water is excessively hard, most of the hardness being due to bicarbonates, (carbonate hardness 3 grains per gallon).

4. Treatment Plant and Methods:

a. Water is pumped from the MacKenzie intake by a 6x4x6 inch duplex pump of variable capacity. The pump on Bosworth Creek is a portable gasoline driven unit. Two Hygia press sand filters 4 feet in diameter each operated at 75 - 125 gallons per minute are employed.

These are regularly back-washed with treated water, the interval between washings depending upon the variation in turbidity and pressure build-up. Finished water is stored in a tank of approximately 63,000 gallons capacity. The system turns about approximately 31,000 gallons per day.

b. No chemicals other than chlorine are used in the purification system.

c. During seasons when water is relatively free from suspended matter about 1.5 ppm of chlorine added on effluent side of filter by means of a Wallace and Tiernan Hypochlorinator. The normal contact period is about 48 hours. This treatment results in a residual of 0.4 ppm at points near the storage tank dissipating at points more remote from the tank.

d. Bacteriological examinations on the raw and treated water from both sources have failed to indicate the presence of organisms of the coli-aerogenes group. All total bacterial counts have been consistently low.

5. Distribution System or Methods:

a. The height of the water in the storage tank maintains an average static pressure of 12 lbs. per square inch on the system. A 2-inch piping system carries water to the kitchen, mess hall, hotel and boiler house. It is laid on top of the ground in insulated boxes. A steam line traces all water pipes to prevent freezing.

b. An emergency fire pump system is connected directly to the water distribution system. There is a cross-connection in the treatment plant between the raw and treated water.

6. Medical Department Supervision.

a. The medical officer located at Norman Wells has the necessary equipment and experience to conduct routine bacteriological examinations on the water supply. He also is able to make routine residual chlorine tests. Bacteriological examinations are done once a month.

b. The water system is inspected at least bi-monthly by a Sanitary Corps officer.

c. The operation of the system is under the direct supervision of the medical officer stationed at this camp. A sanitary officer with the Corps of Engineers who is a water supply engineer has inspected this system and may be consulted at any time on problems which may arise.

7. Recommendations:

That the cross-connection between the raw and treated water be eliminated in the treatment plant.

Bear Island.

1. This camp is located on Bear Island in the MacKenzie River directly opposite the Norman Wells camp.

2. An average of 5000 gallons are used daily.

3. Source of Supply:

a. Water is pumped from the MacKenzie River the year around.

b. During the break-up of the ice in the spring, the water becomes exceedingly turbid. It may be turbid at various times during the summer months depending on the rainfall. There are no factors that tend to cause contamination. The water contains no injurious chemical contaminates. It is low in chlorides and sulfates, and is not excessively hard, (carbonate hardness - 3 grains per gallon).

4. Treatment Plant and Methods:

a. Water is pumped about a mile from the river to the camp. It is then treated with a Wallace and Tiernan portable purification unit having a maximum capacity of 15 gallons per minute.

b. No chemicals other than chlorine are used.

c. Application of hypochlorite is varied to maintain 0.4 ppm residual at various points in the distribution system.

d. Bacteriological analyses of the treated water has not been done as yet.

5. Distribution System or Methods:

a. The treated water is stored in a 1000-gallon elevated tank. A static pressure of 12 lbs. per square inch is developed. The water is piped to mess hall, shower rooms and laundry.

b. A cross connection is available to by-pass purification plant in case of fire, but this is disconnected by means of a union at all other times.

6. Medical Department Supervision:

a. Laboratory facilities for bacteriological examination are available across the river at Norman Wells. A chlorine test set is provided with the purification plant. Daily measurements of the residual chlorine are made.

b. Daily inspections of the water purification unit have been made by the medical officer stationed at the camp.

c. An occasional inspection is made by a sanitary officer of the Corps of Engineers.

7. Recommendations:

a. That bacteriological examinations be made on this water supply at least once a month by the medical officer stationed at Norman Wells.

Ft. Smith.

1. The camp is located on the Slave River in the Northwest Territory near the boundary of the province of Alberta, Canada.

2. About 2000 gallons of water is used a day.

3. Source of Supply:

a. During the winter, water is pumped from beneath the ice in the Slave River. After the break-up water is obtained from a spring on the bank of the river.

b. The spring is well protected from contamination. It is allowed to flow into a 3500 gallon canvas tank.

4. Treatment Plant and Methods:

a. Water is pumped either from the river or from the canvas tank at the spring into a tank truck and transported to the water treatment plant. The plant consisted of two 3500 gallon canvas tanks, one for raw water and the other for treated water. The water is pumped from the raw tank through a Wallace and Tiernan portable purification plant and into treated water tank.

b. Soda ash and alum are added as per directions of the manufacturer of the purification unit.

c. Hypochlorite solution is added at a rate sufficient to maintain a residual of 0.4 ppm after a 24 hour contact period.

d. Bacteriological and chemical analyses of the treated water are not available.

5. Distribution System or Methods:

a. The treated water is pumped into a tank truck and hauled to the various buildings where it is pumped into small storage tanks which are located over the various wash rooms and shower rooms. These tanks are filled daily. Since the treatment plant is in the same building with the mess hall, water is piped through a heater and into the kitchen.

6. Medical Department Supervision:

a. The only laboratory facilities available are those at the Station Hospital in Edmonton, Alberta, which is 500 miles south of Ft. Smith. A test set for residual chlorine is used regularly at the treatment plant.

b. The system is inspected monthly by a Sanitary Corps officer.

c. Supervision of operation by medical department personnel consist only of the monthly questioning of the operator by the visiting sanitary corps officer.

7. Recommendations:

a. None.

Waterways.

1. This camp is located in the town of Waterways, which is situated at the juncture of the Athabaska and Clearwater Rivers.

2. An average of 7500 gallons of water are used daily.

3. Source of Supply.

a. Wash water and water for fire protection is pumped from the Clearwater River. Drinking water which amounts to about 100 gallons per day is obtained from the McInnes Products Company well in the town of Waterways.

b. The well from which the drinking water is obtained is well protected. There are no apparent sources of contamination.

4. Treatment Plant and Methods:

a. The pump at McInnes well runs about eight hours a day pumping an average of 2400 gallons. The drinking water for the camp is drawn into 55 gallon drums and chlorinated in the drums. Enough hypochlorite is added to insure a 0.4 ppm residual chlorine at the point of consumption.

b. The water used for washing purposes is drawn directly from the river, heavily chlorinated with a Wallace and Tiernan Hypochlorinator, and pumped into a 10,000 gallon elevated tank.

c. Bacteriological analyses of the water used for drinking purposes indicate that it is potable.

5. Distribution System or Methods:

a. The drinking water is hauled to the camp by truck and dispensed into small water cans throughout the installation. The water cans are fitted with spigots and paper drinking cups are available. The cans are steam sterilized once a week.

b. The wash water is piped to the kitchen, latrines, showers, etc. throughout the camp. Signs are posted prohibiting the use of this water for drinking purposes.

6. Medical Department Supervision:

a. Laboratory facilities for bacteriological examination of water are available at the Station Hospital in Edmonton, Alberta, which is about 250 miles south of Waterways. Specimens are regularly sent into the laboratory for testing. A test set for residual chlorine is regularly used at the installation.

b. Monthly inspections of the water supply and methods are made by a Sanitary Corps officer.

7. Recommendations:

a. None.

/s/ MAX E. MORGAN
MAX E. MORGAN
2nd Lt. SnC
Asst. San. Off.

SPNSM 1st Ind. (7 Jun 44)

ASF, NWSC, District Headquarters, U. S. Army, Edmonton, Alberta, 15 June 1944

TO: The Commanding Officer, Northwest Service Command, U.S. Army, Edmonton, Alberta.

Noted and forwarded.

/s/ ROBERT C. MOFFITT
Major, Corps of Engineers
Acting District Commander.

721.5 (Edm) 3 2nd Ind. (7 Jun 44) SPNSM

ASF, HQ., NORTHWEST SERVICE COMMAND AND OFFICE OF THE DIVISION ENGINEER, APO 722, MINNEAPOLIS, MINN., 16 June 1944. HAB/ms

TO: The Surgeon General, Office of the Surgeon General, Washington 25, D.C.

Approved and forwarded in partial fulfillment of letter, ASF, S.G.O., dated 18 March 1944, SPNDS 720.2-1 (NWSC)AA, Subject: Sanitary Surveys of Water Supply Installations, in accordance with AR 40-205. RLR CSS

For the Commanding Officer:

CHARLES R. MUELLER,
Colonel, Medical Corps,
Chief, Medical Branch.

CARROLL S. SVARE,
Major, Medical Corps,
Assistant.

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
APO 702, Whitehorse, Y.T., Canada

SPWSM 16 June 1944

SUBJECT: Special Sanitary Surveys of Water Supply Installations in NWSC.

TO: The Surgeon General, U. S. Army, Washington 25, D. C. (THROUGH: Military Channels).

1. Inclosed are reports on surveys of water supply installations in Whitehorse District, Yukon Territory, Canada; Skagway District, Alaska; and Fairbanks District, Alaska.

2. The reports are made in accordance with par 11a (3), AR 40-205, as requested by the Chief of Medical Branch, ASF, Hdq., NWSC, Edmonton, Alberta, Canada, letter dated 31 March 1944, File No. SPNSM, Subject: "Special Sanitary Surveys of Water Supply Installations in Accordance with AR 40-205."

For the Commanding Officer:

Merritt S. Dunlap,
Major, Corps of Engineers,
Executive Officer.

3 Inclosures:
Whitehorse District Report (in tripl.)
Skagway District Report (in tripl.)
Fairbanks District Report (in tripl.)

Subject: Special Sanitary Surveys of Water Supply Installations in NWSC HAB/md

1st Ind. (16 Jun 44) SPNSM

ASF, Hq, NORTHWEST SERVICE COMMAND AND OFFICE OF THE DIVISION ENGINEER, APO 722, MINNEAPOLIS, MINNESOTA, 22 June 1944.

RIR

TO: The Surgeon General, ASF, Washington 25, D. C.

1. Approved and forwarded in partial fulfillment of letter, ASF, SGO, dated 18 March 1944, SPNDS 720.2-1 (NWSC)AA, Subject: "Sanitary Surveys of Water Supply Installation", in accordance with AR 40-205.

CSS

2. Immediate action is being taken on the recommendations contained in these reports.

For the Commanding Officer:

CHARLES R. MUELLER
Colonel MC
Chief of Medical Branch

CARROLL S. SVARE
Major MC
Assistant

3 Incls.
Incl 1 Whitehorse District Report,
Incl 2 Skagway District Report,
Incl 3 Fairbanks District Report.

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y.T., Canada

14 June 1944

SANITARY SURVEY - WATER SUPPLY - WHITEHORSE DISTRICT

WHITEHORSE, YUKON TERRITORY, CANADA

1. The military and civilian installations in Whitehorse adjoin the unincorporated town of Whitehorse which is located in the southern part of the Yukon Territory along the west bank of the Lewes River, a tributary of the Yukon River. Water was obtained from McIntyre Creek and was made available to the Station Hospital and surrounding units between October and November, 1943. Prior to that time water was obtained from the Public Roads Administration treated Lewes River Supply and shallow wells.

2. The McIntyre Creek water system is a surface supply having a drainage area of approximately 24 square miles. The watershed is in the old "Whitehorse Copper Belt" and is made up of granite, limestone, gravel, sand, silt, and clay deposits. None of the copper mines were active. The area was uninhabited, except for occasional white and Indian trappers, and an Alaska Highway control station. Vegetation was thin, evergreens were small and stunted in growth, and the terrain was raggedly mountainous. There was an approximate difference in elevations of 3,000 feet between the high and low points on the watershed, a distance of about nine miles. Snowfall in this vicinity was reported to be generally light and remained about six months out of the year. According to the Canadian Department of Transport weather station, air temperatures varied from a minimum of -56.9° F. on 9 February 1943 to a maximum of +78.8° F. on 5 August 1943. The average temperature for 1942 and 1943 was +32° F. McIntyre Creek crossed the Alaska Highway at a point approximately one-half mile above the water supply intake. The creek was a rapid mountain stream averaging about 8 feet in width and two feet in depth, usually clear and never known to freeze or dry up. Crude stream measurements indicated the flow to be never less than 5 cubic feet per second and averaged about 25 cubic feet per second.

3. Water flowed by gravity from a submerged wooden box in the stream channel through two 6-inch steel pipes to a concrete pumping well (5' x 12' x 7'). Water was pumped by two 350 gallon per

minute, gasoline motor driven Layne turbine pumps having a combined pumping capacity of approximately 800,000 gallons per day. Since ice formed on the intake wooden box screen and coarse screens on the steel pipes, it was necessary to remove all screening in the winter. Slush ice formed in the covered and inclosed pump well. In order to prevent "needle" ice formation, a steam line was installed in the intake and pump well. Chlorine may be added through a manifold to each pump suction by means of a gas machine (MSP-M Wallace and Tierman), which has a capacity of 10 pounds per 24 hours, or to the discharge side of the pumps by means of a hypochlorinator (HEMP, Wallace and Tiernan), which has a capacity of 60 gallons per 24 hours. Complete spare parts were not available for the gas machine. During the early days of operations, the water was treated by means of a homemade drip chlorinator. Water was pumped from the well through a 6-inch steel line to a 210,000 gallon steel storage tank. The tank was in a heated wooden building, and "floated on the line". From this point, water flowed by gravity through an 8-inch and then two 6-inch steel lines to the high level area (USED, Canol, Airport and BPC) and thence through 6,900 feet of 6-inch steel pipe to the low level area, where the pressure was reduced from 137 pounds to about 60 pounds per square inch. From this point water was distributed through a 14-inch transite main and 6 to 8-inch coast iron laterals to Dowell Company, old PBC, Post, Station Hospital, Northwest Service Command, part of the community of Whitehorse, and Elliott Construction Company. Two 6-inch steel lines branched off in the high level area to the airport. A winterized 210,000 gallon steel tank and two 50,000 gallon covered concrete reservoirs above the airport "floated on the line". (See figure 1). All mains except those in town had an 8 foot earth cover.

4. The Whitehorse laterals were 4 inch wire-wound wood stave pipe and had a five to eight foot earth cover. Approximately 600 feet of water and sewer lines in Whitehorse were laid alongside each other in the same trench. At certain times of the year the ground water level was known to raise above these lines. The water and sewer lines were wood stave pipe and were installed by a Canadian Contractor. This was a dangerous practice and constituted a definite potential health hazard, since the water system could be contaminated by sewage at times of reduced pressure. Therefore, the town was not permitted to cut into the McIntyre Creek system until this was corrected. After several conferences, steps were taken to remove this hazard. According to the engineer for the Canadian Department of Transport, who represented a group of interested local inhabitants, the water line was disconnected at a point before the water and sewer lines came together. In partial confirmation of this, the area engineer said that a new ditch had been dug to make possible a new water connection.

5. With the extension of the water system to the adjoining town, five cross connections between the satisfactory McIntyre Creek water system and unsatisfactory private water systems furnished with either untreated Lewes River water or shallow well water were discovered. These connections were all severed by the owners upon notification. Acceptable cross connections remained with the former PRA water system and airport spring supply. Both these supplies were chlorinated.

6. The Office of The District Surgeon maintained sanitary supervision and laboratory control over the water supply since November, 1943, when the Public Roads Administration water laboratory was taken over by the Surgeon. Operating reports were maintained at the pumping station and a summarized monthly report, including laboratory results, was completed each month and included in the sanitary report. Copies of the forms used, (Figure 2 and Figure 3) are attached. Operation was satisfactory except for temporary periods when personnel terminated or equipment broke down. An average of 45 samples were collected each month from representative points on the distribution system for bacteriological and partial chemical examinations. With the exception of four samples of the raw water which showed a most probable number of 2.2 to 3.9 coliform bacteria per 100 ml., all samples examined since November, 1943, showed the absence of coliform bacteria. Chemical and physical examinations made during the month of May, 1944, showed the following average results:

	Source of sample	Average	Maximum	Minimum
Residual Chlorine (parts per million)	Storage tank	0.40	0.60	0.0
	High level area	0.15	0.25	0.0
	Low level area	0.05	0.10	0.0
Hydrogen ion concentration - pH	Raw	8.0	8.2	7.6
	High level area	8.0	8.2	7.6
	Low level area	8.0	8.2	7.8
Hardness (soap) (parts per million) (as $CaCO_3$)	Raw	196.	208.	186.
	High level area	195.	200.	184.
	Low level area	199.	216.	176.
Alkalinity (Total) (parts per million)	Raw	191.	204.	178.
	High level area	191.	204.	178.
	Low level area	190.	204.	170.

	Source of sample	Average	Maximum	Minimum
Temperature of water (degrees Fahrenheit)	Raw	39.	41.	38.
	High level area	42.	43.	40.
	Low level area	42.	44.	41.
Water consumption (Approx. gal. per day)		376,000	410,000	360,000

The average chlorine dosage was 1.3 parts per million, based on water consumption estimates.

7. The new water system was cross-connected with the satisfactory former PRA water system; however, the PRA mains were not completely winterized. This system supplied the immediate needs of Elliott Construction Company, PRA camp, Northwest Service Command, and Post for several months. It had a capacity of about 150,000 gallons per day. The Elliott Company was located only 600 feet from the new McIntyre Creek system. It was considered very desirable to maintain the original PRA system, from the Lewes River to the new mains, as an auxiliary water supply to insure an uninterrupted water supply for the Post and Station Hospital in emergency. This was recommended because of the unusually large number of leaks discovered, faulty construction uncovered, poor ground conditions, extreme cold, and other imponderables. Consideration was given to winterization of this old water system.

8. The new water supply is adequate to meet present domestic demands, although the quantity of water available in the low level area is limited to about 750 gallons per minute, the capacity of the 6-inch steel line running from the high level of the low level area. Water consumption was estimated at 66 Gallons per capita per day. The McIntyre Creek Water was clear, colorless, hard and tasteless except for a very short period when phenolic tastes were noticeable. Difficulty due to precipitation of calcium carbonate scale in heater coils, tanks and hot water lines is expected, unless the water is preheated, stabilized or otherwise treated before use. The iron content is excessive and may cause staining of plumbing fixtures and laundry.

9. Recommendations:

a. That competent and dependable personnel be obtained to operate the McIntyre Creek pumping Station to assure that the water supply is properly treated at all times.

b. That the Elliott water supply from the Lewes River be retained as an emergency standby supply, but the cross-connection between this supply and the McIntyre Creek supply be physically broken unless control comparable to the McIntyre Creek supply can be assured.

c. That the airport spring supply be retained as an emergency standby supply, but the cross-connection between this supply and the McIntyre Creek supply be physically broken unless control comparable to the McIntyre Creek supply can be assured.

d. That the Surgeon be consulted in reference to any physical changes to the McIntyre Creek water supply system which may affect the quality of the water.

For the District Surgeon:

JOSEPH A. SALVATO, JR.
Captain, Sanitary Corps

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y. T., Canada

15 June 1944

SANITARY SURVEY - WATER SUPPLY - WHITEHORSE DISTRICT

ALASKA HIGHWAY, WHITEHORSE DISTRICT, YUKON TERRITORY, CANADA

1. Army and civilian installations along the Highway, including maintenance stations, pumping stations, repeater stations, and relay stations, obtained water directly from drilled wells, lakes and streams, or hauled water from these sources.

2. Drilled wells were generally 60 to 300 feet deep, 4 to 12 inches in diameter and cased for at least one half the depth. The capacity of the wells was limited, running between 15 and 60 gallons per minute with the exception of one well which yielded approximately 150 gallons per minute. Several of the wells silted up or ran dry. In some cases, organic material clogged the well screen. Permafrost was encountered at depths ranging from 13 to 95 and 190 feet. The strata penetrated consisted of silt, peat, clay, boulders, gravel, sand and, occasionally granite, limestone and quartzite. The water bearing strata was generally sand and gravel. Static water levels in wells ranged from 8 to 130 feet below the ground surface. Chemical examinations of samples of water examined in the Industrial Laboratories, Edmonton, Alberta, Canada, and the water laboratory at the Station Hospital in Whitehorse showed the water to be clear, colorless, attractive to the taste, moderately hard, and non-corrosive. The above is summarized from information available on 14 drilled wells in the Whitehorse and Fairbanks Districts. Drilled wells, were not, as a rule, chlorinated. Where permafrost was penetrated, the danger of freezing always existed unless the well was kept in continual operation. Wells were generally 100 feet or more from sources of sewage pollution.

3. The lake sources used were clear and in most instances very satisfactory for water supply when treated. Every effort is made to encourage proper chlorination of surface water at maintenance and contractor camps.

4. Streams used as sources of water supply were satisfactory except in the Spring when heavy run-off and thawing caused the streams to become muddy. Infiltration wells were built at some camps to overcome this condition and were satisfactory except at those places where fine silt entered the well. Chlorination was being accomplished at some of the camps but was not satisfactory at others. Here again, every effort is made to encourage proper chlorination of surface water at maintenance and contractor camps. Refer to Figures 3 and 4.

5. In most instances, army installations hauled water from a nearby lake, spring or stream. Water was hand chlorinated in accordance with recommendations of this office. Refer to Figure 3.

For the District Surgeon:

JOSEPH A. SALVATO, Jr.
Captain, Sanitary Corps

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y. T., Canada

13 June 1944

SANITARY SURVEY - WATER SUPPLY - SKAGWAY DISTRICT

SKAGWAY, ALASKA

1. The City of Skagway, including military units, the railroad yard, docks and contractors' installations, obtained water from a reservoir which is fed by Lower Dewey Lake, Upper Dewey Lake and Icy Lake. Icy Lake may be fed by Reid Falls. The watershed is restricted, uninhabited, very mountainous, and drains an area of about 6 square miles. Vegetation is fairly dense, consisting mostly of evergreens, but thins out at higher elevations to nothing but rock, ice, and, in the winter months, snow. Water from the check dam below Lower Dewey Lake flowed by gravity through a 6-inch wire-wound wood stave pipe and discharged to a housed open wooden storage tank having a capacity of approximately 50,000 gallons. In addition, a 4-inch cast iron by-pass connected to a 16-inch penstock, which furnished water to the hydro-electric plant, also supplied the tank through a 2-inch float valve. Chlorine was added to the 6-inch line as the water emptied into the storage tank by means of a constant feed, electrically operated, belt drive hypochlorinator (Chemical Equipment Company). The chlorinator had a capacity of 45 gallons per 24 hours. There were no spare parts available for the machine. From this point water flowed by gravity through about 1,000 feet of 10-inch wire-wound wood stave pipe to the distribution system and then to another 50,000 gallon housed wooden storage tank floating on the line. The distribution system consists roughly of 4 miles of 4, 6, and 10-inch wood stave pipe, under a pressure of from 40 to 60 pounds per square inch. It is said to be about six years old. A schematic flow diagram of the Skagway water supply System, giving other pertinent information, is attached.

2. Chlorination was not proportional to the quantity of water consumed, hence chlorine residuals were very variable. Perchloron was said to be applied at the rate of 5.6 pounds per day; however, daily operating reports were not maintained. Weekly water samples were collected from the distribution system for bacteriological examination and were sent to the Territorial Department of Health in Juneau, Alaska. More recently, water samples were examined at

the Whitehorse Station Hospital water laboratory. The treatment plant had been operated by the Veterinary Detachment, but was turned over to the Post Engineer. Laboratory reports on samples collected during the past four months showed the absence of the coliform group of bacteria. A water sample was collected on 21 February 44 for routine chemical examination at the Northwest Service Command Medical Laboratory. The report indicates that the water was clear, colorless, moderately soft, but slightly corrosive. The iron content was slightly below the recommended maximum.

3. There were no means available for determining the actual water consumption. The former water plant operator estimated that 150,000 gallons of water were used daily during peace time. Present estimates vary from 500,000 to 600,000 gallons per day. These estimates reflect a high per capita consumption--approximately 200 gallons per day--due probably to leaks, and locomotive and boat usage. A cross connection was known to exist within the city limits between the treated city water supply system and the untreated high pressure supply to the hydro-electric power plant. Another cross-connection existed at the far end of the distribution system between the city system and an unprotected spring and a fire pump well. Water from the spring could be pumped into the second elevated storage tank located near the railroad and into the distribution system in case of fire, water shortage, or other emergency. Water normally used at the hydro-electric plant served as an auxiliary supply and also as an emergency high pressure supply in case of fire. It was, therefore, not unusual to have untreated water in the distribution system. The existence of physical cross-connections between a treated water supply and an untreated surface water, unprotected spring, or well supply is poor public health practice and should not be permitted.

4. The water supply at the new hospital should prove to be satisfactory if properly operated. The water supply system consisted of a 30 foot deep by 9 foot diameter dug well, one Deming 100 gallon per minute electric or shaft driven pump and one 100 gallon per minute electric driven pump, a water operated, Wallace and Tiernan hypochlorinator, and a 150,000 gallon covered wooden storage tank.

5. Stations and section houses obtained water from upland streams and lakes. In the winter months, water was obtained by melting ice or snow. Chlorination of surface water supplies was uncommon.

6. Recommendations:

a. A minimum of 0.4 parts per million residual chlorine should be maintained at all times in active parts of the distribution system for at least 30 minutes from the time the chlorine is initially applied.

b. Cross-connections between a treated water supply and a water supply of questionable safety should not be permitted. Although there are many acceptable methods to protect drinking water supplies from accidental or willful contamination, the means given below are believed to be the most practical under existing circumstances. Since an adequate supply of water for fire fighting is essential, the following suggestions are made to protect the city water supply and still have an ample supply of water in case of fire.

(1) Connections between the spring and fire pump well systems and the city distribution system, including the water storage tank, should be physically broken. A separate pipe system connected to another water storage tank, fire hydrants, and stand pipes near the railroad roundhouse could be permitted provided there is no physical cross-connection between this system and the city water system. Or, for emergency.

(2) The spring should be protected at its source. It should be provided with a water-tight concrete wall extending from two feet above ground level down to the water hearing strata, so as to prevent the entrance of superficial ground water. A tight cover should also be provided to prevent the entrance of small animals or accidental pollution. A ditch should be dug above the spring to divert surface water around the spring. The overflow from the spring to the fire pump well should be a steel pipe, since it passes beneath the railroad bed, and the fire pump well should be water-tight concrete, provided with a tight top. The overflow should be screened and above high water level. If the spring supply is to be maintained, routine water samples should be collected continuously for bacteriological examination to assure that the water remains safe. If confirmatory satisfactory laboratory reports are not received, the supply should be disconnected and abandoned as a drinking water supply. It is believed that if this is accomplished, and the spring water supply remains of equal sanitary quality to the city water supply, it will not present a health hazard if pumped into the distribution system.

(3) The four inch cross connection within the city limits between the city water system and the hydro-electric power plant penstock should be broken. A larger float-controlled valve, say 4 inch, should be provided at the water storage tank in place of the existing two inch float-controlled valve to partially offset this loss. (If this is done and the storage tank kept full, the 10-inch wood stave pipe line from the storage tank will yield 4,370 gallons per minute at the end of 1,000 feet and 1,785 gallons per minute at the end of 5,000 feet, assuming a head of 92 feet or 40 pounds per square inch. With a head of 138 feet, or 60 pounds per square inch, the 10 inch line will yield 5,500 gallons per minute at the end of 1,000 feet and 2,210 gallons per minute at the end of 5,000 feet (based on Scobey's Formula). It is believed that this flow, coupled with the additional water made available from the spring and pumping well system, as discussed above, if retained, will more than meet Fire Underwriter requirements. This, of course, should be checked.

c. A main line compound meter or other measuring device should be provided on the line from the water storage tank in order to estimate more accurately the amount of water consumed and to enable the accumulation of important data for future reference.

d. The existing privately-owned constant-feed electrically-operated hypochlorinator, for which no spare parts are available, should be used as a stand-by, and an automatic type chlorinator, which would proportion the quantity of chlorine used to the flow of water from the water storage tank should be provided. This may be accomplished by the installation of an automatic hypochlorinator or a gas machine which would inject a chlorine solution in the incoming water at a rate proportional to the rate at which the water leaves a storage tank, using an orifice, venturi meter, or a main-line compound meter, as indicated. The installation of a water-operated, meter-controlled hypochlorinator would probably be the most economical installation for the Army. An automatic gas chlorinator would be desirable inasmuch as the operating cost over a period of time would probably be cheaper than a hypochlorinator. (See attached sketch showing recommended changes to chlorination.)

e. Daily operating reports showing the daily water consumption, quantity of chlorine used, chlorinator setting, and results of residual chlorine determinations should be maintained. Copies of these reports

should be sent to the District Surgeon, to the Territorial Department of Health, and to other interested departments.

f. The 6-inch intake at the check dam should be protected and improved.

g. The 6-inch wood stave line to the docks should be checked for leaks and repaired or replaced with tight pipe.

h. White Pass and Yukon Railroad: Water used for drinking purposes on land conveyances should be of the quality prescribed by the Drinking Water Standards of the United States Public Health Service and should be secured only from a source which is approved by the Surgeon General of the United States Public Health Service as producing water of satisfactory sanitary quality and safety. The Whitehorse McIntyre Creek water supply has, in the opinion of the writer, met these standards and hence drinking water should be obtained from this source. The Skagway water supply would not meet the Public Health Service Drinking Water Standards unless protected as recommended. Water hydrants, taps, or faucets should be properly located, constructed, and maintained to assure protection of approved drinking water against contamination. Hose lines and buckets used for the delivery of water from hydrants to conveyances should be of satisfactory material, should be properly handled, and used only for this purpose. They should be equipped with adequate protective devices. For greater details, reference should be made to "Sanitary Manual for Land and Air Conveyances Operating in Interstate Traffic," Public Health Reports, January 29, 1943.

For the District Surgeon:

JOSEPH A. SALVATO, JR.
Captain, Sanitary Corps

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y. T., Canada

13 June 1944

SANITARY SURVEY - WATER SUPPLY - SKAGWAY DISTRICT

CHILKOOT BARRACKS, ALASKA

The water supply at Chilkoot barracks was obtained from Lily Lake and flowed by gravity through 5 to 3-inch steel pipe and through a 66-inch pressure sand filter to a 60,000 gallon closed elevated tank. Overflow from the storage tank was carried to a 600,000 gallon fenced-in open concrete reservoir kept for emergency. The filtered water was chlorinated by means of a Wallace and Tiernan meter controlled water operated hypochlorinator. A 3-inch Crest-Irident meter was used. Water flowed to a 6-inch cast iron distribution system to all parts of the camp and to the former Foley Brothers Camp. A 100,000 gallon storage tank in this area floated on the line. Pressures between 38 and 98 pounds per square inch were maintained on the system. Decayed vegetation in the raw water supply caused a loss head of 10 to 12 feet, making it necessary to back-wash the filter daily. The flow of water through the plant was approximately 108,000 gallons and 7 pounds of Perchloron were used daily. A standby electrically operated Wallace and Tiernan hypochlorinator was available in the plant. It was possible to supply Haines with a limited quantity of water. Coagulants were not used and the backwashing pump was of inadequate capacity. Operation was otherwise very satisfactory.

For the District Surgeon:

JOSEPH A SALVATO, JR.
Captain, Sanitary Corps

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y. T., Canada

15 June 1944

SANITARY SURVEY - WATER SUPPLY - FAIRBANKS DISTRICT

FAIRBANKS, ALASKA

1. Inspections of the water supplies used by District installations in Fairbanks were made 18 May 1944, in company with a representative of the Repairs and Utilities Branch. There were four main sources of supply. District Headquarters, Zehnder Camp, Slater Camp, the Staff House, and Motor Pool Garage (comprising about 600 persons) were supplied with water purchased from the Fairbanks Exploration Co., a privately-owned enterprise. The former CCC camp, occupied by about 68 men from SU 2450, the Canol Camp, having about 50 persons, and the Base Camp, comprising about 200 persons, were supplied by District operated wells. Water samples were collected for bacteriological examination at the time of the inspection. Each water supply is discussed separately below.

a. Fairbanks Exploration Company Water Supply. This water supply consisted of one dug well, one drilled well in an open pit subject to surface contamination, and three housed drilled wells. The dug well, which was the source usually available to the District, was 20 feet deep, 8 feet square for the upper 12 feet, and 4 feet in diameter for the lower 8 feet. The upper portion consisted of tight fitting wood sheeting. The lower portion consisted of steel sheeting. From information available, the drilled walls were approximately 60 to 100 feet deep, and were cased for the entire depth. All the wells were connected to a common header, making possible the use of any well or combination of wells. Water from the dug well was pumped by a 275 GPM centrifugal pump into the distribution system, consisting of 3 and 4-inch steel lines, and into a float controlled elevated 5,000-gallon housed steel tank floating on the line. The wells were located within 50 to several hundred feet from sewers and cess pools. A steam line ran parallel to the water line to prevent freezing. Although recommendations for chlorination of this supply had been made previously by Malcolm Pirnie, Jr., USPHS, 14 May 1943, and by Captain Bogost, Sanitary Officer, this had not been accomplished. The general superintendent of the Fairbanks Exploration Company refused to chlorinate the water supply, and would not permit chlorination of water available to the company. Therefore, unless the Fairbanks Exploration Company

could be persuaded to take action, it would be necessary to install three or four proportional feed chlorinators, one on each main leading to each camp area, to protect the district water supply. Routine samples for bacteriological examination were collected in the past, and available reports showed the absence of coliform bacteria in the dilutions examined. The water had an unpleasant odor, appearance, and taste, probably due to the iron bacteria, crenothrix, which grew in abundance in the dug well. Reports on complete chemical and microscopic examination of the water were not available, and facilities for such examination were not to be found locally. This is a poor water supply; however, it is believed that it can be improved by chlorination and the application of copper sulphate, activated carbon, coagulation and filtration, or a combination of such accepted practices.

b. SU 2450 Water Supply. This was at old CCC camp water supply. Details of its construction were not known or available in the Post Engineer's files. The well, apparently a driven point, was located beneath the orderly room floor. Water was obtained from the well by a shallow well reciprocating pump, and was pumped through a pressure tank to the distribution system. The water was clear, colorless, and attractive, except for a slight mineral taste. Samples for bacteriological examination collected in the past showed the absence of coliform bacteria; hence, the water was considered safe to drink. There were no known sources of sewage pollution in the immediate vicinity.

c. Canol Camp Water Supply. The status of this camp was in doubt at the time of the inspection. It appeared that this camp would be taken over by the Air Base. In any case, the water supply consisted of a capped drilled well, 6 inches in diameter and probably 100 feet deep. Water was pumped out of the well by means of a turbine pump, through a pressure tank and into the distribution system. Water, sewer, steam, condensate and recirculating lines all run in a shadow wooden box to prevent freezing of lines. The sewer line ran below all others. There were no known possible sources of sewage pollution except a wire wound wood stave sewer which passed within about 200 feet of the well, and a gravel borrow pit receiving sewage, located about 1,000 feet from the well. This water was cold, clear, colorless and attractive except for a slight mineral taste. Reports on samples collected for bacteriological examination during the past few months showed the absence of coliform bacteria.

d. Base Camp Water Supply. This installation is located just off the Richardson Highway, about 6 miles south of Fairbanks.

The water supply consisted of the two 6-inch drilled wells approximately 100 feet deep. Each well was rated at 60 gallons per minute. One well was being repaired at the time of the inspection. The other well was equipped with an automatic electrically driven turbine pump. All water pumped was chlorinated by means of an electrically operated Wallace and Tiernan hypochlorinator as it entered 1,000-gallon steel pressure tank. Working pressure was maintained between 40 and 50 pounds per square inch. The water was distributed through a 4-inch steel distribution system housed in a wooden box, together with sewer, steam, condensate and pump return lines. The sewer line, 2 6-inch wound wood stave pipe, was approximately 2 feet below the welded steel water main. This combination of pipes passed within 100 feet of the well; however, it was considered of no particular health significance. A satisfactory residual chlorine was found in the water at the time of two visits to the camp. Laboratory reports on this new water supply were not available.

2. Recommendations. Improvement in operation and control, where indicated in the water supplies discussed above, is to a very large extent dependent upon local conditions and the duration of supervision by this command. The following is considered fundamental and essential for proper sanitary control.

a. Fairbanks Exploration Company Water Supply. Inasmuch as the District water supply is obtained from a shallow dug well, and since this supply is cross-connected with an open drilled well located in an open pit collecting surface water and ground water, all water available from this source should be adequately chlorinated, as has been previously recommended.

b. The collection of routine water samples for bacteriological examination at least monthly from the District CCC camp, Canol Camp, and the Base Camp should be continued. This will be accomplished by the Sanitary Officer at the time of his periodic visits.

For the District Surgeon:

Joseph A Salvate, Jr.
Captain, Sanitary Corps

ARMY SERVICE FORCES
NORTHWEST SERVICE COMMAND
Whitehorse District
Whitehorse, Y. T., Canada

15 June 1944

SANITARY SURVEY - WATER SUPPLY - FAIRBANKS DISTRICT

ALASKA HIGHWAY, FAIRBANKS DISTRICT, ALASKA

1. Drilled wells were generally 60 to 300 feet deep, 4 to 12 inches in diameter and cased for at least one half the depth. The capacity of the wells was limited, running between 15 and 60 gallons per minute with the exception of one well which yielded approximately 150 gallons per minute. Several of the wells silted up or ran dry. In some cases, organic material clogged the well screen. Permafrost was encountered at depths ranging from 13 to 95 and 190 feet. The strata penetrated consisted of silt, peat, clay, boulders, gravel, sand, and, occasionally, granite, limestone and quartzite. The water bearing strata was generally sand and gravel. Static water levels in wells ranged from 8 to 130 feet below the ground surface. Chemical examinations of samples of water examined in the Industrial Laboratories, Edmonton, Alberta, Canada, and the water laboratory at the Station Hospital in Whitehorse showed the water to be clear, colorless, attractive to the taste, moderately hard, and non-corrosive. The above is summarized from information available on 14 drilled wells in the Whitehorse and Fairbanks District. Drilled wells, were not, as a rule, chlorinated. Where permafrost was penetrated, the danger of freezing always existed unless the well was kept in continual operation. Wells were generally 100 feet or more from source of sewage pollution.

2. In instances where water was hauled, water was hand chlorinated in accordance with recommendations of this office. Refer to Figure 3.

For the District Surgeon:

JOSEPH A SALVATO, JR.
Captain, Sanitary Corps

16 January 1944

SPNKD

Service Command Surgeon, Hq. Northwest Service Command,

Whitehorse, Y. T.

The Director,
Alaska Highway Maintenance,
Hq. Northwest Service Command,
Whitehorse, Y. T.
(ATTN: Major Weddington).

SUBJECT: Contaminated Water Samples.

1. Reference is made to our message-form, this subject, 2 January 1945. Samples of water supply at camps, Mile 956, 1016, 1056 and 1156 showed evidence of contamination. The Station Hospital Laboratory forwarded containers to each of these camps for samples for immediate check on Potability. Check samples were not received to date from camps, Mile 1016 and 1156. It is urgent that those be received as quickly as possible.

2. Check sample of water supply at Mile 1056 camp indicates continued contamination. This supply is not potable. Domestic consumption of water from this source without disinfection should be discontinued immediately. Pending the installation and operation of a hypochlorinator in this system you are advised to notify all personnel in this camp to consume no water until it has been properly chlorinated in a covered lyster bag or covered stock pot equipped with spigot.

3. As of 6 January 1945 the water supply at Mile 956 camp was still stored in a wooden barrel in the kitchen and no chlorination of this supply is reported.

4. You are again advised that the operation of hypochlorinators in the system at each of these camps is an essential safeguard to the health of these personnel.

For the Commanding General:

CHARLES R. MUELLER
Colonel MC
Service Command Surgeon

cc: Director of Operations
Service Command Engineer

CARROLL S. SVARE
Lt Col MC
Executive Officer

ADDRESS REPLY TO: The Commanding Officer

ARMY SERVICE FORCES
Headquarters, Northwest Service Command
and
Office of the Division Engineer, Northwest Division
APO 722, Minneapolis, Minnesota

Refer to File No. SPNSM 12 August, 1944

SUBJECT: Special Sanitary Survey of Water Supply Installations covering Headquarters, and Headquarters Operational Area.

TO: The Surgeon General, A.S.F., Washington 25, D. C. (THRU: Commanding Officer, Northwest Service Command, APO 722, c/o Postmaster, Minneapolis, Minnesota).

Pursuant to the provisions of Par 11a (3), AR 40-205, and letter directive Northwest Service Command file SPNSM, Subject: Special Sanitary Surveys of Water Supply Installations, the following report is submitted:

MEM/k

1. There are numerous installations of the Northwest Service Command located in the north side of the city of Edmonton, Alberta, Canada. They are the Station Hospital, Quartermaster Depot, 843rd Signal Service Battalion, Northwest Service Command Headquarters, Namao Airport (under construction), Finance Office, and several equipment and supply warehouses and yards.

2. The monthly average water consumption is approximately 5.5 million U. S. Gallons.

3. Supply source of Water.

a. Water is purchased from the City of Edmonton. The supply is entirely adequate.

b. Water is obtained from the North Saskatchewan River, the tributaries of which are located in the Canadian Rocky Mountains. Since the watershed is practically uninhabited, the factors which tend to cause contamination are negligible.

The following is the average of chemical analyses made on the raw river water by the Edmonton City Water Chemist, during 1943.

	Winter Months PPM	Summer Months PPM	Average PPM
Calcium carbonate	142	98	120
Calcium sulfate	26	-	13
Magnesium sulfate	86	50	68
Magnesium carbonate	--	--	--
Sodium chloride	4	4	4
Organic matter	12	14	13
Total solids	270	166	218
Carbonate hardness	142	98	120
Non-carbonate hardness	86	40	63
Total hardness	228	138	183
Alkalinity	142	98	120
P.H.	7.9	8.1	8.0

Turbidities ranges from 0 to 1800 ppm. Color ranges from 0 to 215 ppm. Hardness ranges from 100 to 320 ppm. Total bacterial count ranges from 140 to 20,000 per cc.

4. Treatment Plant and Methods.

a. Two 36-inch intakes located in the middle of the river conduct the water to a well on the river bank. From the well the flow is to a low-level pit in the pumping station. Two electric pumps capable of delivering forty million gallons# per day to the treatment plant are located in the low level pit. Two steam operated stand-by pumps are also located at this point.

The treatment plant consists of chemical mixing chambers and sedimentation basins rated at ten million gallons per day. The filtration plant consists of twenty-four - $\frac{1}{2}$ million gallons per day rapid sand filter units. Filters are backwashed with treated water once every forty-eight hours during winter months and as often as every twenty-four hours during summer months. Treated water is discharged into a storage reservoir.

Pumps rated at thirty-two million gallons per day discharge treated water into city system via two thirty-inch mains (north side) and two twenty-inch mains (south side).

All operational data expressed in Imperial gallons.

b. The schedule of chemical treatment employed consists of soda lime softening with two stage carbonation and alum coagulation. Ammonium sulfate is also added in the first mixing chamber. The average dosage is as follows:

Lime	- 10.1 grs/gal.
Soda ash	- 1.4 grs/gal.
Alum	- 0.2 grs/gal.
Ammonium sulfate	- Equivalent in weight to amount of chlorine added.
Copper sulfate	- 0.2 ppm added after filtration for algae control in reservoir.

c. Gaseous chlorine is added in the mixing chamber along with other chemicals. From 80 to 220 pounds are used per day to maintain an effluent residual of 0.4 ppm. The contract period varies from two hours in the summer months to seven hours in the winter months. Standby equipment is available for emergency post chlorination.

d. Following is the average chemical analysis of the treated water as produced in 1943-1944:

	Summer months PPM	Winter Months PPM
Dry residue	8	6
Sodium chloride	5	5
Calcium sulfate	6	18
Magnesium sulfate	28	27
Calcium bicarbonate	52	43
Sodium bicarbonate	--	--
Sodium sulfate	22	65
Total solids	121	164
Total hardness	73	73
PH value	9.3	9.2
Bacteria count per cc	3	3
B. coli	-	-

5. Distribution System.

a. The city distribution system is all steel piping. A pressure of forty-five pounds per square inch is maintained in the large mains supplying the system. Service is continuous throughout the city.

b. No cross-connections are present in the system and proper protection against backflow from swimming pools, etc., is provided.

6. Medical Department Supervision.

a. Routine weekly samples collected at the various Army installations are examined for total bacteria content and coliform content at the U. S. Army Station Hospital laboratory. Chlorine residuals are determined at the time of sampling.

b. The purification plant has been visited by a sanitary officer about once every three months. Cooperation between the city water department and Medical Department personnel has been satisfactory.

7. Recommendations:

a. None.

For the Surgeon:

MAX E. MORGAN
2nd Lt Sn. C.
Sanitary Officer

1st Ind. (12 August, 1944) SPSAD

ASF, Hq., NORTHWEST SERVICE COMMAND AND OFFICE OF THE DIVISION ENGINEER, APO 722, c/o Postmaster, Minneapolis, Minnesota, 14 August 1944

TO: The Surgeon General, A.S.F., Washington 25, D. C.

This report completes the survey of all water supply installations in the Northwest Service Command.

For the Commanding Officer:

E. E. KIRKPATRICK
Colonel, General Staff Corps
Chief of Staff

ARMY SERVICE FORCES
Headquarters,
NORTHWEST SERVICE COMMAND

M E M O R A N D U M
(For inter-office use only)

FILE NO. SPNSM DATE: 22 September 1944

SUBJECT: Special Sanitary Survey, McIntyre Creek Watershed.

FROM: Captain Salvato TO: NWSC Sanitary Officer.

1. Reference memorandum, dated 9 September 44, attached, to Service Command Surgeon, same subject.

2. Another survey of the watershed made 18 September 1944 shows no significant change in quality of the water and no action taken to follow recommendations made in par 3 of the above mentioned memorandum. The survey again shows that contamination of the Whitehorse water supply originates just below the point of engineer activity at the old copper mine.

3. Recommend corrective action as previously indicated.

SALVATO

ARMY SERVICE FORCES
Headquarters
NORTHWEST SERVICE COMMAND

M E M O R A N D U M
(For inter-office use only)

FILE NO. SPNSM DATE: 9 September 1944

SUBJECT: Special Sanitary Survey, McIntyre Creek Watershed.

FROM: Sanitary Corps Officer TO: Service Command Surgeon

1. Sanitary surveys of the McIntyre Creek watershed were made between 27 August and 4 September 1944 to determine the possible cause of the persistent presence of coliform bacteria in samples of the raw water collected at the pumping station intake. Water samples were collected in conjunction with the sanitary survey.

2. The survey and laboratory reports show that the contamination originated in the vicinity of the copper mine.

3. It is recommended (a) that the copper mine access road be posted as being on the Whitehorse watershed with penalty stipulated for committing any nuisance which might pollute the water supply; (b) that a properly constructed pit privy be provided not closer than 200 feet of McIntyre Creek or its tributaries, and convenient to the men working near the copper mine. The privy should be properly maintained and, upon completion of work, closed in accordance with FM 8-40.

SALVATO

14 Incls.
Laboratory Reports

1st Memo Ind. (9 Sept 44) SPNSM

FROM: Service Command Surgeon TO: (Attention: Post Engineer)

For your information and necessary action.

SVARE

14 incls. n/c

SPWRU 2nd Ind.

ASF, NWSC & NWD, Post Engineer, Whitehorse, Y. T. 28 September 1944

TO: Service Command Surgeon, Northwest Service Command, Whitehorse, Y. T.

Paragraph 3 of basic communication has been complied with.

/s/ HUBERT L. GOODMAN
HUBERT L. GOODMAN
Major, Corps of Engineers

14 Incls.

CHAPTER 10

Disposal of Water

PART I. Liquid Wastes.

The municipal sewerage system of the City of Edmonton serves all the Army installations in that area. The city has a primary type of sewage treatment, consisting of sedimentation and separate sludge digestion, with sludge drying beds. Treated effluent is discharged into the North Saskatchewan River well below the water supply intake.[8]

At Dawson Creek the Northwest Division constructed an Imhoff tank and sludge drying beds to replace an old existing septic tank. Provision was made for post-chlorination in a chlorine contact tank prior to discharge into Dawson Creek. These facilities served the Army area only. In 1944 the Town of Dawson Creek constructed a sewer system and a primary treatment plant, employing Dorr clarifiers, on the south end of town. The effluent is discharged into Dawson Creek about one and one-half miles below the Army sewer outlet. Due to the curtailment of operations in this area chlorination of Army effluent was never applied.[8]

At Whitehorse an Imhoff tank was used for sewage treatment. No plant operator was employed as such and considerable surface sludge built up in this tank. However, no complaints were received as the plant effluent was discharged into the Lewes River well below all occupied areas.[8]

In 1943 Skagway had a civilian population of 450, there were 1300 civilian contractors' employees and 1650 military personnel. The town is poorly located from the standpoint of sewage disposal. It had a very high ground water table. It was reported on 25 September 1943 that recent storms had caused a swelling of the Skagway River inundating the Army hospital area and part of the tank farm (Standard Oil). The town was overrun with cesspools with a result that the subsoil of the whole area was claimed to be saturated with human wastes. The Army provided septic tanks at its installations and some were also installed in the Standard Oil area. There was considerable bickering as to who would install a sanitary sewer system for the whole of the Skagway Area. Sewage was conveyed thru open ditches, poorly graded, to tidal water outlets.[3] A sanitary sewer system was placed in operation on 21 February 1944. No collective sewage treatment is provided. The outfall sewer discharges directly into the Bay.[1]

Chilkoot Barracks has a modern sewerage system. Settled sewage is discharged into tidal water at Chilkoot Inlet. The nearby town of Haines is about 25 per cent sewered with discharge into Chilkoot Inlet.[4]

At Camp Canol and Norman Wells septic tanks were employed with discharge of treated effluents into the Mackenzie River.[8]

All military and civilian camps in outlying areas were provided with either septic tanks or leaching cesspools. Occasionally some of the latter didn't leach because of the imperviousness of the soil and it became necessary to periodically pump them out and dispose of the wastes in the garbage dump area.[8]

Where pit latrines had been constructed in the early days of the project pits were required to be backfilled, mounded and posted when the area was vacated.[8]

PART II. Garbage and Refuse Disposal.

Garbage and refuse were collected jointly in all installations in this Command. At Skagway combustible wastes were incinerated and the residue plus all non combustible refuse were dumped onto a bar and carried out with the outgoing tide. At Dawson Creek and Whitehorse the Army operated modifications of the land fill method of wastes disposal. All other installations had garbage dumps, for the most part in uninhabited wilderness. All installations have refuse disposal sites approximately a mile from camp, as a fly control measure, in compliance with existing regulations. Periodically these dumps were "bulldozed" over the earth. While the medical department discourages garbage dumps they were found the most practical disposal method in the virgin territories in which our line camps were located. It can at least be said that they were equal to anything employed by civil authorities in any of the municipalities within the territorial limits of this Command.[8]

CHAPTER 11

Control of Insects

Mosquitoes were plentiful in this territory but have been only a pest problem. The Division of Entomology of Canada's Department of Agriculture, in it's "Report on the 1944 Anopheline Mosquito Survey in Canada" had only Aedes spencerii, Aedes vexans and Culiseta inornata identified in Edmonton. All of the foregoing were collected from light traps, no field survey work was done and the Edmonton area was the only one reported on within the confines of this Command. The writer found an abundance of Aedes communis and Simuliddae in the Dawson Creek, Ft. Nelson and Muncho Lake areas. Insects of the species Chironomides and Coreidae, Sp. were also in abundance in the Ft. Nelson area. Confirmation of the identity of these species was received from Baldwin Lucke, Lt. Col. M.C. Deputy Curator, Army Medical Museum, Washington. Other reports indicate that Anopheles quadrimaculatus, a malaria vector, and A. vexans, A. punctor, A. aldrichi, A. campesteris, A. dorsalis, A. spencerii, A. nigromaculis and A. flavescens are common in this region, particularly in British Columbia.[8]

Other insects and arachnids found in this area include the common wood tick (Dermacentor andersoni), fleas (Xenopsylla cheopis), the common house fly, the horse fly, cockroaches, bedbugs, gnats, midges and the centipedes normally found in the United States.

In the spring and summer, control of breeding places of mosquitoes is a difficult problem as the muskeg pools are almost universally prevalent. In these seasons of the year the Aedes mosquitoes and the biting midges, locally known as "no-seeums" are the most pestiferous. These persistent blood suckers are small enough to get thru the ordinary screen mesh used in our installations.

In general the insects found in this Command area have not been vectors of any reported diseases. During the spring and summer their importance has been limited as noxious pests. The common house fly and the cockroach are considered the greatest health hazard encountered. Medical department inspection personnel have construed their presence in messhalls as the surest signs of poor mess and camp sanitation.[8]

With the advent of ample housing accommodations in 1944 universal screening of windows and doors was employed. All camps were provided with insecticides and flypaper and instructed in the proper use of these items in the messhalls. Fly traps were used to a limited extent but without much success, thru lack of proper attention. Insect repellents

were widely distributed but used to a limited extent. A limited amount of oiling of water courses was employed in the mosquito control work with success at Dawson Creek. Oiling was also generally used around pit latrines as a fly control measure. Garbage dumps were kept a mile or more from cantonment areas and were periodically covered.[8]

Before DDT was made available fumigation of barracks in bedbug eradication (1943-1944) was accomplished with hydrocyanic gas, using discoids. In this period ordinary QM issues of insecticide sprays and powder were used unsuccessfully in roach control work in mess halls. Incidentally, only about a dozen infestations with these pests occurred thru the whole period of this history but these isolated conditions occurred in locations all the way from Edmonton to Fairbanks and Norman Wells.[8]

In 1945, DDT was made available in both powder and solution. "DDT crews" were provided by the Post Engineers at Whitehorse and Edmonton and both teams worked under the supervision of the writer. The five per cent solution of DDT was used exclusively. Since that time six civilian barracks in Whitehorse, one civilian barrack at Ft. St. John, Mile 49 and one military barrack in Edmonton were sprayed for bedbug control. Two large military messhalls were sprayed in Edmonton for roach control and one hospital ward containing 10 patients, was sprayed for control of pubic lice when several of these patients were infested from the ward latrine. Over a year has elapsed since the first spraying with five per cent DDT insecticide solution and no reoccurrence of any vermin has been found, even where infestations were extremely heavy.[8]

The Alaskan Division, Air Transport Command, also did periodic spraying of DDT from aircraft at its various bases in this area.

CHAPTER 12

Control of Rodents

The species of rodents found in this territory are of medical importance primarily because they constitute large flea reservoirs. However, no flea borne diseases have been reported for personnel in this Command.[8]

Rats have not been encountered, excepting at Skagway, Haines and other port locations where they offered no medical problem. Field mice have invaded several camps over a widespread area. Rabbits are superabundant throughout the entire area. Squirrels frequently inhabited the vicinity of the camps. Beavers and porcupines are only infrequently seen in road travel.[3,8]

Mice have invaded food storerooms in several Alaska Highway Maintenance Camps, and in Norman Wells and Edmonton. Normally trouble from this source was only encountered in early winter. Experience indicated that cats, poisoned bait, traps, rotation of stocks and similar measures were ineffective, the only control measure effectively employed was to rodent proof the building by sealing up with sheet metal all the avenues of entrance.[8]

In 1943, due to a history of tularemia in the Peace River area, an order was published by the Commanding Officer of Camp Prairie prohibiting the handling, skinning or eating of wild rabbit. Tularemia has not been encountered in Command personnel.[3]

Squirrels were occasionally seen in camp areas but offered no medical problem. Beavers were very rarely seen and offered no medical problem. Porcupines were seen more often. Canadian law prohibits the shooting of these rodents presumably because they are easily captured and killed and are reported to be an excellent source of food for individuals who become lost.[8]

CHAPTER 13

Immunization

The four aspects of communicable disease control, physical inspections, food inspections, sanitation and vaccinations, have been employed in full measure thru the history of the War Department in this area. Considering the vastness of the area covered and the innumerable quantities and types of camps envolved, the seemingly uncoordinated medical services in the early organizations and the large numbers of War Department civilian and contractors' employees involved the problem on the whole has been very well handled.

In accordance with AR 40-210, Letter AGO 720.3, 11 March 1942, SGO Circular Letter No. 162, 28 November 1942, WD Memo No. W 40-7-43, 11 February 1943, WD Circular No. 85, 26 March 1943, ASF Extract No. 30, 24 April 1943 and WD TB MED 114 entitled "Immunization," 9 November 1944, the following immunizations of all personnel, military and civilian, were completed prior to or on entrance to this theater: smallpox vaccination, triple typhoid vaccination, tetanus toxoid immunization. There has never been any indication of a need for immunization of all personnel for any other communicable diseases to this Command.

Military personnel were required to be immunized as indicated above prior to departure for this Command from the United States. In the few instances in which this was not accomplished the required immunizations were brought up to date on arrival.

Some civilian employees were in the Command area prior to establishment of the U.S.E.D. Health Service. The attached Northwest Division Circular 39, 27 February 1943 covers such personnel with respect to required immunizations.

Stimulating doses of triple typhoid vaccine and tetanus toxoid were administered to all personnel as directed. In general, periodic memoranda on required immunizations were issued to all department heads, officers and company commanders, and sanitary officers checked on the status of compliance with such directives in the course of routine inspections.

There were rare occasions on which individuals were exempted from immunizations on the recommendation of the surgeon. Any civilians who refused immunization for reasons not accepted by the surgeon were discharged. Normally the threat of discharge sufficed to change the attitude of such civilian employees.

The U.S.E.D. Health Service had officers, civilian nurses and civilian employees. No enlisted personnel were involved. The nurses were permitted to administer immunizing vaccines as indicated in the attached instructions to first aid personnel entitled "Procedure on Inoculations Given at First Aid Stations." Qualified enlisted personnel of the Northwest Service Command, and later the Northwest District, Sixth Service Command, have been authorized to administer "booster shots." This was a convenience, and frequently a necessary procedure, in outlying stations remote from Station Hospitals.

Local medical supply officers experienced little difficulty in shipping biologicals. Only on one or two occasions were small shipments of such biologicals affected by temperature changes enroute to local destinations. It became the custom for the supply officer to improvise suitably insulated containers and adequate shipping facilities for safeguarding biologicals in transit. All camps where qualified first aid personnel were stationed were equipped with adequate refrigeration so no local storage problem for vaccines was encountered.

More recently, in accordance with WD Circular No. 267, 5 September 1945, all military personnel of the Northwest District were immunized with influenza vaccine. Civilians were not included in this program. The basis for this program was the expected outbreak of influenza during the 1945-46 winter season. The anticipated outbreak was not forthcoming in the District, at least the indication as would be evidenced in civilian personnel, was lacking.

In general medical officers on the job here concur in the opinion that a "healthy" climate and the scattering of a large percentage of the strength of this Command in isolated camps thru a large area helped materially in keeping the incidence of communicable diseases at a minimum.

WAR DEPARTMENT
Office of the Division Engineer
Northwest Division NWDM I
Edmonton, Alberta, Canada

February 27, 1943

DIVISION CIRCULAR LETTER NO. 39

SUBJECT: Department Health Service

TO: District Engineers, Area Engineers, Contractors, and All Concerned.

1. GENERAL

a. The Northwest Division Engineer Health Service, staffed by Medical Department officers of the United States Army, will be responsible for the rendering of a complete health service to all persons employed in the performance of work under the administration of the Division Engineer, Northwest Division.

b. The Engineer Health Service will utilize existing military facilities, both Canadian and American, and also existing local civilian clinics and hospitals when necessary and available. In addition to the above facilities, the Engineer Health Service will place such dispensaries and aid stations where and when needed.

c. A Medical Corps officer of the United States Army will be assigned to the staff of each District Engineer. Such officer will be the District Medical Officer and will be responsible for the establishment and maintenance of health service in his district, under the administrative supervision of the District Engineer. Junior Medical Officers will be assigned to each district as deemed necessary by the District Engineer.

d. The utmost cooperation will be maintained among all United States Government Agencies, both military and civilian, in the accomplishment of the medical plan of the Northwest Division Engineer Health Service.

2. MEDICAL CARE:

a. All employees who are citizens of the United States and who are working outside the Continental Limits of the United States will be entitled to required medical care free of all costs for all injuries and illnesses not due to their own misconduct.

b. All employees other than United States nationals will be entitled to required medical care free of all costs for all compensable illnesses and injuries.

c. Dependents of United States nationals will be furnished medical care insofar as facilities are available, at cost plus 20%. Such care will be at the discretion of the District Engineer.

d. Treatment of noncompensable injuries and illnesses may be given employees not citizens of the United States, who are quartered and subsisted by the U.S.E.D. or their contractors at cost plus 20%.

e. Necessary treatment will be given all cases, military or civilian, at all times.

3. PROCEDURE IN COMPENSABLE CASES:

a. U.S.E.D. Employees:

The U.S.E.D. Personnel Section will be responsible for the proper execution of all U.S.E.C.C. forms. Civilian employees compensable by the United States Employee's Compensation Commission (both U.S. Nationals and Canadians) must have the required U.S.E.C.C. compensation forms of the CA series executed. Either form CA 16 or CA 17 is necessary when an employee is treated by the United States Government of civilian agencies other than U.S.E.D. Health Service. U.S.E.C.C. Form CA 1 must be executed at the time of the injury. U.S.E.C.C. Form CA 2 will be initiated by the immediate superior of the injured employee and completed by the Medical Officer treating the case. Upon completion, these forms will be submitted to the U.S.E.D. Personnel Section for proper disposition.

b. Contractor's Employees:

(1) All employees, regardless of the nationality of the contractor, engaged in work in the Yukon, Northwest Territories and Alaskan are subject to Longshoreman's Act as amended by the P.L. 208, 77th Congress.

(2) All U.S. Nationals and Canadian Nationals employed by U.S. contractors in Alberta and engaged in work in Alberta are subject to the compensation laws of Alberta.

(3) All employees of Canadian Contractors, regardless of the nationality of the employees, engaged in work in B.C. are subject to the compensation laws of B.C.

(4) All employees of U. S. contractors engaged in work in B.C., regardless of their nationality, are subject to the Longshoreman's Act as amended by P.L. 208, 77th Congress.

4. MEDICAL ACCOUNTS WITH LOCAL PHYSICIANS, LOCAL HOSPITALS AND OTHER GOVERNMENT AGENCIES:

a. All accounts previous to the inception and operation of the Northwest Division Engineer Health Service must be approved for payment of reimbursement by an authorized representative of the Division Engineer preferably by an Engineer Health Service Medical Officer.

b. No medical expenses voluntarily incurred, subsequent to the establishment of the Northwest Division Engineer Health Service, by employees of the U.S.E.D., the various contractors, subcontractors and/or their authorized representatives, will be approved without prior authorization of the District Medical Officer acting in the name of the District Engineer.

c. It is to be stressed that all existing medical facilities will be utilized and it will be the responsibility of the District Medical Officer acting for the District Engineer to approve such facilities.

5. SICK LEAVE AND ANNUAL LEAVE FOR MEDICAL REASONS:

a. It will be necessary for all employees to report all illnesses to the nearest aid station or dispensary immediately.

b. No sick leave will be granted unless the above is complied with, and no reimbursement will be made contractors for such necessary wages or salary paid an employee who does not report his illness or injury immediately.

c. Individual contracts with the employee will be the basis for the consideration of payment of wages and salaries for sick and annual leave.

6. PHYSICAL EXAMINATIONS AND IMMUNIZATIONS:

a. As directed in Division Circular #23 (revised) Subject: "Physical Examinations and Immunizations - - - - " it will be necessary for all contractor's employees to successfully pass a pre-employment examination, and obtain the required inoculations before entering the Northwest Division.

b. Those employees working on projects in the Northwest Division previous to the establishment of the Northwest Division Engineer Health Service will be given a complete examination as directed by the District Medical Officer and receive the required immunizations as a requisite for the continuation of their employment. It is anticipated that these examinations will be given during the month of March 1943.

c. All U.S.E.D. employees will be given an examination and receive the required immunizations. The U.S.E.D. Personnel Section will be advised of the date when this service will start.

d. In general, it will not be required of prospective employees to have an urinalysis of serological examination. These will be done only at the discretion of the U.S.E.D. Medical Examining Officer in the United States.

e. The following medical examining offices are now in operation in the United States:

(1) Medical Examining Office, 307 to 309 - 1331 Third Avenue, Seattle, Washington.

(2) Medical Examining Office, 201 Pere-Parquette Bldg., Minneapolis, Minnesota.

(3) Medical Examining Office, 729 South Figuero Street, Los Angeles, California.

(4) Medical Examining Office, 270 Broadway, New York, New York.

Please note this circular includes the address of the Seattle Office which was not included in the Division Circular No. 23, mentioned in 6 a above.

7. This circular will be revised and supplemented when necessary.

For the Division Engineer:

/s/ H.J. Woodbury
H.J. WOODBURY
Colonel, Corps of Engineer

Distribution
Normal Office
Edmonton District (120)
All Other Districts (50)
Contractors (50)

Certified a True Copy /s/Frank G. Manning
Captain, SnC

FIRST AID PERSONNEL INSTRUCTIONS

PROCEDURE ON INOCULATIONS GIVEN AT FIRST AID STATIONS

1. Only 2nd or 3rd inoculations to be given by nurses at First Aid Stations. No inoculations to be given by other than qualified doctors or registered nurses at any time.

2. Complete and forward to Engineer's Dispensary the form required daily. Also keep a copy for your records.

3. Inoculations should be scheduled for the last hour of the work shift. Ten Grains aspirin given each man with instructions to take before retiring.

4. Notify personnel departments of individual contractors of schedule and request they inform all men arriving from the "States" where and when to go to complete inoculations.

5. Equipment needed at each First Aid Station for inoculations:

1 - 1 cc syringe
2 - 10 cc syringes
12 - needles, 25 gauge or 23 gauge
1 qt. Alcohol, 40% ethyl adding denaturant
400 cc Typhoid vaccine
180 cc Tetanus toxoid
20 Epinephrine soluble salt
3/200 gr. Hypo tablet (1 tab. in 1 cc makes 0.1% solution)
For sensitivity reactions - if necessary - injections in doses of 0.3 cc to 0.8 cc in solution 1,1000. Repeat in few minutes if necessary.

IMPORTANT: To the Nurses or Doctors concerned.

If the man was given the initial or second inoculation of (Smallpox), Tetanus Toxoid, or Typhoid Anti-toxin in the States, mark dates of such on this form. (As per above).

Sign employee's Form 81, (Inoculation record) which he should have on his person, by initialing the dose given--then signing the back of the form with your full name.

NO INITIAL INOCULATIONS SHALL BE GIVEN BY FIRST AID STATION NURSE PERSONNEL AS THE FIRST INOCULATIONS ARE GIVEN AT THE DISTRICT MEDICAL EXAMINING OFFICE WHEN EMPLOYEE RECEIVES FINAL PHYSICAL EXAMINATION.

CHAPTER 14

Intestinal Infections

The intestinal infections herein referred to include the following: bacterial food poisoning, common diarrheas, bacillary and amebic dysentery, dysentery unclassified, typhoid and paratyphoid fevers, undulant fever, hookworm and all other diseases spread thru contact with urine or feces.

General control measures enforced to the limits of the means available included sanitation of food and personnel, protection of water supplies and fly control. Of the whole group of intestinal infections only bacterial food poisoning, the common diarrheas, bacillary dysentery, dysentery unclassified and one case of hookworm have reared up in this Command.[2]

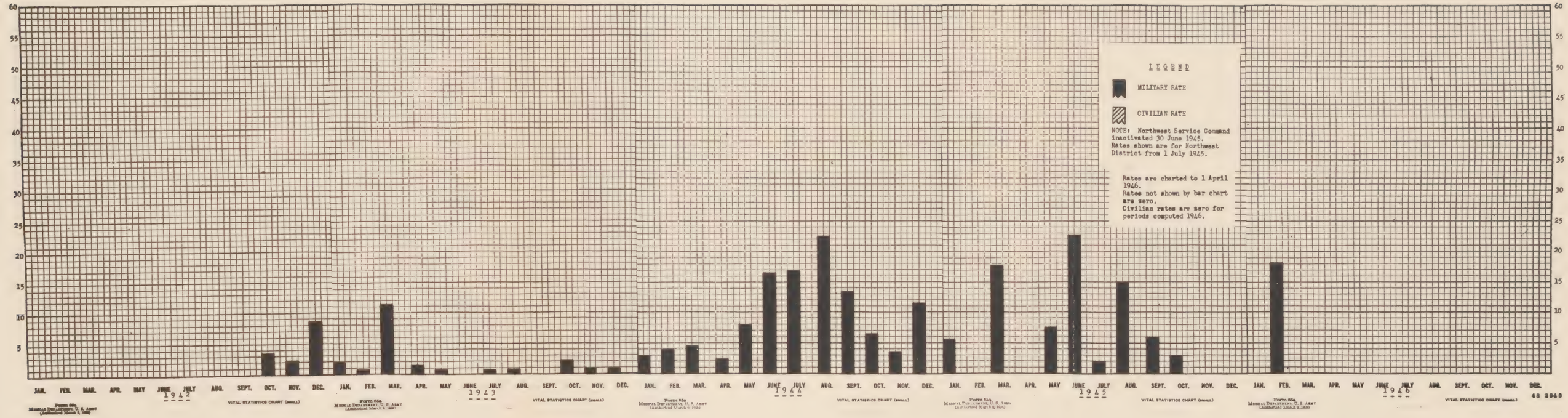
In 1943 there was a high incidence of gastro-intestinal diseases ranging from gastric hyperacidity and gastro neurosis to peptic ulcer. The increase was ten attributed to the influx of new units to the Command in which were contained a high proportion of older age groups and limited service men. These men had been reclassified by draft boards and many had an EPTI status. The minor gastric disturbances could properly be attributed to the monotony of the diet at that time. The professional opinion was that low morale, due to monotonous meals, could have been reflected in gastric disorders as an "escapte."[1]

The dysentery rate remained relatively low throughout. This disease is known to be endemic in civilian settlements in this Command. Our last report on dysentery was for two cases, unclassified in October 1945, at the Edmonton Station Hospital.[2]

One outbreak of bacterial food poisoning occurred among the civilian employees of Metcalfe-Hamilton-Kansas City Bridge and Bechtel-Price-Callahan Companies in Skagway in the fall of 1943. This was traced to home made ice-cream, the batter for which had been left in a warm place for some eighteen (18) hours before being frozen. The vast majority of the cases recovered in a few hours following treatment with magnesium sulphate and a sedative.[2]

The common diarrheas presented no particular problem. Routine inspections, with emphasis on mess sanitation, were more forcefully brought home to those with command functions whenever and wherever the diarrheal rate showed a tendency to increase. In the overall picture the relative

NORTHWEST SERVICE COMMAND
ANNUAL ADMISSION RATE PER 1,000 STRENGTH
DIARRHEAL DISEASES



number of cases was small and all were easily controlled. There was, however, one outbreak of severe diarrhea at Camp Canol. This was traced to the use of large amount of left over creamed chicken in a contractor mess. It was an established fact that repeated admonitions had previously been issued and mess personnel had been cautioned on the "do's and don'ts" of leftover foodstuffs. There were from time to time similar but milder outbreaks, usually in contractor messes, but others did not enter the medical records. There would be no knowledge of such outbreaks were they not picked up by the Sanitary Officers in the course of routine inspections. In the case of such sporadic and mild outbreaks the tendency was to "hush it up" and try to avoid the spotlight on local failures to adequately enforce sanitary mess regulations.[2]

It is surprising that the diarrheal diseases rate was not appreciably higher in the early days of this Command. There were rapid changes in mess personnel in contractor camps. Education of camp managers and mess stewards in such things as fly control measures was a slow and difficult problem. Getting teeth into the recommendations of sanitary officers frequently outlasted the fly season or other potential hazard. The contractor was the prime recalcitrant. Mess sanitation in War Department military and civilian messes was far superior in every respect though facilities were normally far less adequate. By 1945 screening of buildings, where required, had become universal; the flush toilet had replaced the pit latrine even in the most isolated camps; dishwashing procedures had become more standardized; mess personnel had become conscious of the need for mess sanitation and how to accomplish it; "the tail began to swing the horse," and camp foremen, along with company commanders, were contacting medical facilities to assure that monthly examinations were conducted on schedule; our people had been educated.[8]

In August 1943 one case of hookworm infection was discovered in a soldier from Mississippi. Otherwise there were no helminthic diseases within this Command.[2]

The typhoid fevers, undulant fever and similar types of intestinal diseases, have never been reported here. The first group has, of course, been thwarted by compulsory immunization of all War Department and contractor personnel.[2]

Attached hereto is a chart showing the hospital admission rate per 1,000 per annum for the diarrheas. Civilian, as well as military rates, are shown from 1944, at which time civilian records were started on the Statistical Health Report, W.D., M.D. Form No. 86ab.[2]

Attached also is Northwest Service Command Medical Laboratory Memorandum, subject: "Procedure in disease out-break," dated 16 September 1943, which was circulated to all Medical Officers of this Command.

NORTHWEST SERVICE COMMAND
MEDICAL LABORATORY
APO 722, GROUP F
Seattle, Wash.

HEW/rn

16 September 1943

SUBJECT: Procedure in disease out-break.

TO: All Medical Officers, Northwest Service Command.

1. In the event that any disease condition, in military personnel or nearby civilian communities, tends to exceed endemic proportions, or if an unusual disease should be encountered, the Commanding Officer, Northwest Service Command Medical Laboratory, will be promptly notified.

2. In actual outbreak of food poisoning, diarrhea, or other disease reaching epidemic status, the Commanding Officer, Northwest Service Command Medical Laboratory, will be immediately advised by the most rapid means of communication. The Service Command Laboratory is located at Edmonton, Alberta, Canada, in the Station Hospital area, telephone 73561.

3. Upon receipt of information as outlined above the Commanding Officer, Northwest Service Command Medical Laboratory, will immediately advise the Chief, Medical Branch, Northwest Service Command, for consultation as to appropriate measures to be instituted for study and control of the disease.

/s/ H. E. WRIGHT
/t/ HARRY E. WRIGHT
Lieut Colonel, Medical Corps
Commanding

APPROVED:

s/ Walter F. von Zelinski
t/ Walter F. von Zelinski
Colonel, Medical Corps,
Chief, Medical Branch

CHAPTER 15

Infections of the Respiratory Tract and Infections Transmitted by Discharges from the Respiratory Tract

The diseases herein considered include the following:

(1) Diseases predominantly localized in the respiratory tract and transmitted by discharges from the respiratory tract, including the common respiratory diseases (common cold, acute laryngitis, acute bronchitis), septic sore throat, scarlet fever, diphtheria, Vincent's disease, the pneumonias (bacterial, viral, rickettsial), influenza, whooping cough, pulmonary tuberculosis, pneumonic plague.

(2) Diseases of the respiratory tract transmitted by inhalations of infectious material, not necessarily material from the respiratory tract, including coccidiomycosis and psittacosis.

(3) Diseases predominantly localized outside the respiratory tract known to be transmitted or strongly suspected of being transmitted, by discharge from the respiratory tract including meningitis (meningococcal), measles, German measles, mumps, chicken pox and smallpox.

The incidence of the respiratory diseases in the territory occupied particularly with regard to those of the upper respiratory tract is considered less than that found among civilians and compares favorably with that found with civilians in the United States. This was particularly true with influenza even prior to the immunization of all military personnel against influenza in the early winter of 1945-46 (Surgeon General's Letter, 1 October 1945). Tuberculosis also has a high incidence amongst local civilians and particularly among the Indians. The situation with regard to infectious diseases amongst the Indians is well illustrated in a report from the medical officer at Norman Wells who, in April 1944, received a request for aid from the Canadian Government Medical Station at Aklavik at the mouth of the Mackenzie River. Thru the courtesy of the R.C.A.F. ski plane was provided and our medical officer assisted in the suppression of an epidemic of smallpox amongst the Eskimo fishermen. Related inspections at Good Hope, Arctic Red River, Fort McPherson, Hershell Islands and Copper Mine indicated that the Indian population throughout was infected with tuberculosis and that the death rate in some of these locations ran from two to four a week. Active tuberculosis was found in the Eskimos in the Aklavik area but not nearly as much as in the Indians. Eskimos at Copper Mine were found living primitively, still using the igloo system of housing. These people were found in good health and the conclusion naturally drawn was that this was due to minimal contact with the white man and his multitudinous diseases.[3]

At Mills Lake and along the general area of the Peace River road to Norman Wells tuberculosis was high among the Indians and it was found necessary to restrict military and civilian personnel from associating with the Indian population.[3]

The common respiratory diseases were the principal cause of hospital admission. Cases were about equally divided between the usual cold and sore throat.[2]

Of particular interest is a claim made for compensation for monilia infection supposedly acquired on the Alaska Highway. (See further reference to highway dust under "Occupational Health" in Volume IV). Aerobic and anaerobic cultures of fungi on Sabouraud media in serial dilutions was performed on samples of soil from the Highway by the Northwest Service Command Medical Laboratory. Results were negative for pathogenic fungi. This study was confirmed by Dr. E. Silver Keeping, Mycologist, University of Alberta Medical School, who stated "The fungi isolated were all aerobic actinomyces. Naeslund, in Sweden, studied many hundreds of strains of aerobic actinomycoses in experimental animals. In the light of Naeslund's work, the chances of the actinomyces submitted being pathogenic is extremely small." Dr. Keeping also stated that they had been able to isolate monilia from every specimen of sputum on hospital patients submitted to them for examination.[4]

One case of diphtheria was reported in May 1943 from an isolated post.[2]

There was a mild epidemic of influenza in January 1943 without any serious effects. There was also a mild epidemic of influenza in December 1943. No deaths or serious complications ensued. A sever epidemic of influenza among the Indian population at Hay River was reported in March 1943. It was found that the incidence of this disease rose more or less during winter months without any serious consequences.[2]

There were several outbreaks of mumps and measles in 1942 and 1943 in the Peace River (Camp Pioneer) and Waterways (Camp Prairie) areas. Contacts were put in working quarantine.[3]

Meningococcal meningitis was reported once in December 1943 and once in April 1944 at Edmonton. In February 1945 two cases of cerebrospinal meningitis were diagnosed in the Norman Wells area. In 1944 a diagnosis of terminal tuberculous meningitis was made in a child fifteen months of age in the civilian population of Haines, Alaska.[2]

The incidence of pneumonia during 1943 was low considering the adverse conditions under which troops operated. This was rather surprising in relation to the number of respiratory diseases treated. Although the incidence of pneumonia recorded during this period was low, it is believed that this may be partially due to the fact that some cases of pneumonia were diagnosed as they occurred and were treated in the field where they did not have x-ray and laboratory facilities as diagnostic aids. In the winter of 1943 - 1944 incidence of pneumonia increased among the older age groups of civilians, but the incidence remained essentially the same among military personnel. For the remainder of the period of operations incidence of pneumonia generally declined, due probably to better housing and working conditions.[2]

Four cases of scarlet fever were reported from Dawson Creek during December 1942. Another was reported from Camp Canol during January 1943. Sources of infection were unknown.[2]

Vincent's Angina: Dental officers generally estimated that this was existent in personnel to the extent of two per cent in military and four per cent in civilians. In the Whitehorse Area it was very prevalent during the fall of 1944 among civilian employees of Standard Oil Company, poor dental hygiene being revealed by a dental survey and possible transmission of the infection in the civilian mess hall.[3]

There follows a summary report on respiratory diseases by the medical officer in charge of the EENT clinic at the Station Hospital, Dawson Creek, and later the Station Hospital, Edmonton, up to the date of inactivation of each.[3]

> "Infection of the Respiratory Tract did not prove to be a serious problem in maintenance of the health of the Command in this theater. This was reflected in the low incidence and apparent virulence of the disease condition. The winter temperatures, though in the main, lower in degree than most of the Army personnel had been accustomed to, did not exert any serious effect in the etiology of respiratory infections. Considering that most of the personnel had to undergo a change in environment, climate, food and water, it would rather seem that the climate was conducive to good health. This along with proper clothing and instruction in personal hygiene was no doubt an important factor as well. It was further felt that the cold dry air peculiar to most of Northwest Canada played a major role in keeping down the incidence of respiratory infections, particularly the Common Cold. This was brought out in the number of

cases admitted to the Station Hospital at Edmonton, Alberta, Canada, over a period of 2½ years. During this period covering a total, roughly, of 10,000 soldiers, dependents of soldiers, and War Department civilians in the Edmonton Area, there were 374 cases of Nasopharyngitis, acute, catarrhal; 52 cases of Pharyngitis, acute, caused by no predominating organism and 5 cases of "septic sore throat". Of the sinusitis infections, 43 were Maxillary, 40 of which were felt to be flare-ups of a chronic infection; 16 Frontal, 14 diagnosed as an exacerbation of an old condition; 3 Ethmoids which became acute and it was difficult to say whether they had been present before. Serious sinus complications were practically non-existent. The pneumonias total 57 cases of which 28 were of the "atypical" type, 10 of the lobar variety and 19 bronchopneumonias. The incidence of acute and chronic forms of Bronchitis was very low. There were 29 cases of Peritonsillar abscess (Quinsy) admitted, none of which required incision and drainage as all cases responded to the sulfonamides and/or penicillin. Chronic hypertrophic tonsillitis numbered 164, all of which underwent tonsillectomy operation. Of the acute tonsillitis infections, there were 46 mostly of the "follicular" type. Throats healed in the usual manner and the average hospital stay was one week and then the patient was sent to full duty.

"Infections transmitted by discharges from the Respiratory Tract, as far as can be determined, the Common Cold stands out as the worst offender. The out-patient department gave treatment to 446 new cases of "head colds" under the diagnosis of Coryza or Rhinitis. This figure is over and above the Respiratory cases admitted to the hospital. These patients complained of the usual symptoms of head colds such as nasal stuffiness, with or without nasal discharge, moderate throat soreness and slight fever. All temperature cases of 100° F. or over were hospitalized. With regards to the other infections that might be transmitted by discharges from the Respiratory Tract, the following type and number of cases were treated: Measles, 13; Mumps, 22; Scarlet Fever, 20; Diphtheria, 1. There was a low incidence of Pulmonary TB, Meningococcic meningitis, and Whooping Cough. No cases of smallpox or poliomyelitis were seen. Vincent's Angina ran an expected high incidence but at no time assumed epidemic proportions. Influenza occurred in the expected normal frequency. These figures compared favorably with the incidence amongst the local civilian population as was noted in the Provincial Health Reports.

"It is of interest to note that "nose-bleed" (epistaxis) was a common occurrence especially in the winter time. It was felt that the elevation of the sea level (2195 ft.) plus the low humidity were contributing factors. The clinical picture of the condition was that of a dry appearance of the mucous membranes which gave rise to superficial ulcerations of the anterior part of the nasal septum with resultant minor hemorrhages. Also some forms of chronic sinus cases seemed to feel better with respect to their condition while other sinus sufferers were apparently made to feel worse. It was thought that the explanation for this might be the anatomical nasal structure, individual resistance and type of invading microorganisms as the underlying factors.

"First Aid Stations along the Alaskan Highway, of which there were approximately 30 at one time giving service to all troops and civilians, reported very little trouble with serious respiratory infections; again there was a feeling that the dry, cold air kept down contagion."

Proper housing of both troops and civilians was considered essential to the maintenance of good health and high morale. To those who did inspection work it was considered the most important simple factor in the control of respiratory diseases. And by proper housing is meant all the essential elements indicated in AR 40-205. In the beginning men had to use pyramidal tents until housing units were constructed. Then came a critical period of overcrowding of housing units. Every effort was made to provide adequate quarters for all in the shortest possible time. This transition period, short as it was, seemed an eternity. Medical inspection personnel were kept busy trying to assist in making the most efficient use of available housing, trying to cope properly with light, heat, ventilation, sanitation, bed spacing, head to foot sleeping, overcrowding and other problems that constantly seemed to thwart our objective of proper housing for every one in every camp. These missions were effectively accomplished together with the exercise of other control measures including restrictions on certain quarters cases, control of contacts and the overall aspects of mess and food sanitation.[8]

CHAPTER 16

Venereal Diseases

The diseases included in this chapter include gonorrhea, syphilis and any other venereal disease. A diagram is enclosed herewith showing the venereal disease rate for 1000 men per annum thru the history of this Command, including the Northwest District, Sixth Service Command until 1 April 1946 at which time the Station Hospitals were inactivated. The rate has been minimal at 4.5 hospital admissions per 1000 men per annum in December, 1942 and maximum at 77 per 1000 per annum in November 1945.[2]

In accordance with the provisions of AR 40-210, Section VII,, venereal disease control activities came under the general supervision of the Service Command Surgeon. One medical officer at each station hospital was designated Venereal Disease Control Officer in addition to his other duties. In several districts this duty was assumed directly by the District or Area Surgeon. The title Sanitary Officer was conferred on Sanitary Corps Officers in the various districts and these men served as local Medical Inspectors, assuming all local duties of such office including venereal disease control functions such as are indicated in WD Memo, No. W 40-6-42, 9-10-42. Periodically all men were given adequate instruction in the prevention of venereal disease; TF 8-1238 and similar training films were shown in conjunction with lectures on venereal diseases and their prophylaxis (TC 28, 3 Mar. 43). Post exchanges were required to stock and make available for the men satisfactory mechanical and prophylactic kits. Qualified personnel were assigned to prophylactic stations in extra cantonment areas when the situation warranted such establishments. There were occasions when the local surgeon also placed certain places "off-limits" to personnel. Control activities also included the monthly and special inspections of all enlisted men. Reports of Contact of Venereal Disease were promptly processed. In short the Venereal Disease Control Officer, the Area or District Surgeon, and the Service Command Surgeon's Office maintained correlated checks on the effective operation of all measures devoted to the control of venereal disease, including education, prophylaxis, case finding, diagnosis, treatment, development of co-operative relations with U.S.A.A.F. and civil agencies and the recommendation of such administrative measures as were considered desirable.[4]

As would be expected very little contact with venereal diseases were found outside the villages such as Dawson Creek, Whitehorse, Skagway and Fort St. John. The only large city in the Command was Edmonton, consequently the Edmonton Station Hospital showed by far the

highest admission rates of any of the medical facilities. Occasionally a case would be picked up by a dispensary but invariably the contact had just returned from furlough. The following excerpts from the Annual Report of the Service Command Surgeon and from ETMD reports bear out the substance of the general comments above.[1,2]

Ft. Nelson Dispensary: In view of the fact that this area is isolated no problems were encountered in the control of venereal disease. On the whole cases were few and were contacted while on temporary duty elsewhere or while on furlough in the United States.[1]

Whitehorse Station Hospital: The venereal disease problem is practically negligible. Most of the cases have contact histories in which the exposure was sustained outside the Whitehorse Area; this is especially true of soldiers returning from furlough and civilians newly arrived from some other locales.[1]

Skagway Station Hospital: There were only eight venereal disease cases in the year 1944 and no cases (new) of syphilis. One case of sulfathiazole resistant gonorrhea was returned to the States for treatment. All cases were infected elsewhere.[1]

Dawson Creek Station Hospital: Venereal disease rates were low, and the few cases reported were found to have been contacted at sources, for the most part, within the Continental United States.[1]

Johnson's Crossing Dispensary: Venereal disease has not been a major problem in this area although this dispensary has seen and treated ten cases of syphilis and about as many cases of gonorrhea. Other venereal diseases have not been encountered. Several cases of syphilis which were under treatment at this dispensary were merely a continuation of treatment that had been begun in the United States.[1]

Edmonton Station Hospital: The problem of venereal disease control increased with the strength for this area but more particularly with the granting of furloughs. On 1 August 43; Venereal disease, although not a serious problem, was high on the list of communicable diseases. Most cases were acquired outside the Command. Previous to the granting of furloughs, venereal disease was practically negligible. 10 Jan 44: Venereal infections continue to be traced in the main to contacts made in the United States by men on furlough. 1 Mar 1944: Out of the last 281 venereal disease contact reports submitted and analyzed the following pertinent facts were revealed:

33.1% were located within the United States.
The remaining 66.9% were located in Canada, and according to Provinces:

Alberta	34.16% or 96
British Columbia	13.52% or 38
Yukon Territory	7.83% or 22
Northwest Territory	5.34% or 15
All others	6.05% or 17

Of the contacts in Alberta, 54.17% were casuals enroute to or from the United States. Of the total of 281 contacts, 62.63% or 176 were located away from the home station.[2]

Reports on cooperation with civil agencies in the control of venereal diseases were generally satisfactory at each of the Station Hospitals during peak operations. Comments on the measures taken are included in the 1944 Annual Reports of each of the Station Hospitals, as follows:[1]

Skagway: Venereal disease is adequately controlled by monthly physical inspections of troops and close cooperation with civilian health authorities. Prostitution is suppressed very closely by the cooperation of the Port Commander and Civilian Health Authorities.

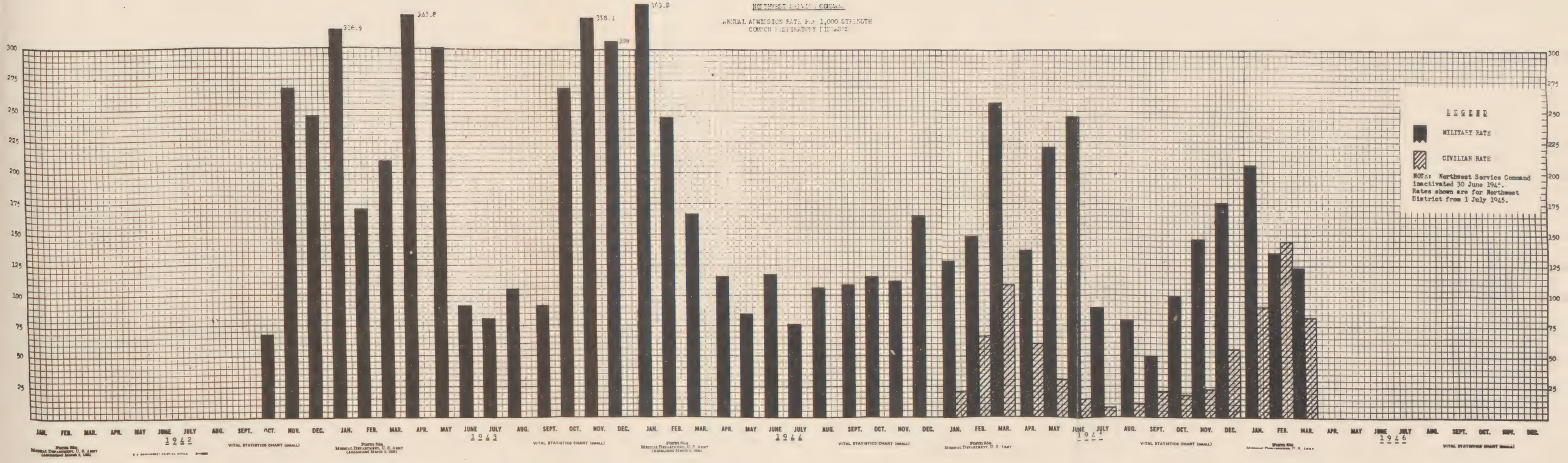
Whitehorse: Only five beds are set aside in the hospital for venereal disease cases and it is very seldom that all of these are filled at one time. Contact histories are made routinely and transmitted to the proper authorities for disposition. A very cooperative relationship has been maintained with local Canadian authorities on all cases which have a local interest.

Dawson Creek: Two prophylactic stations were maintained; one in the town of Dawson Creek, and one at the Station Hospital. Lectures were given, augmented by films, to all troops in the post. Excellent co-operation was obtained with the local health authorities in keeping the source of infection at a minimum.

Edmonton: In February and June of this year two separate films on venereal diseases, one the standard Army film, and the other United States Public Health Service Film, were shown to personnel of the Edmonton Area. Each time, a brief instructive lecture was given by the Venereal Disease Control Officer, and a question period following the showing of the film. Cases of venereal disease in this area have been materially reduced. "Old" and "New" cases admitted to this hospital by

NORTHWEST SERVICE COMMAND

ANNUAL ADMISSION RATE PER 1,000 STRENGTH
COMMON RESPIRATORY DISEASES



Form 52a
Medical Department, U. S. Army
(Authorized March 9, 1938)

VITAL STATISTICS CHART (SMALL)

Form 52a
Medical Department, U. S. Army
(Authorized March 9, 1938)

VITAL STATISTICS CHART (SMALL)

Form 52a
Medical Department, U. S. Army
(Authorized March 9, 1938)

VITAL STATISTICS CHART (SMALL)

Form 52a
Medical Department, U. S. Army

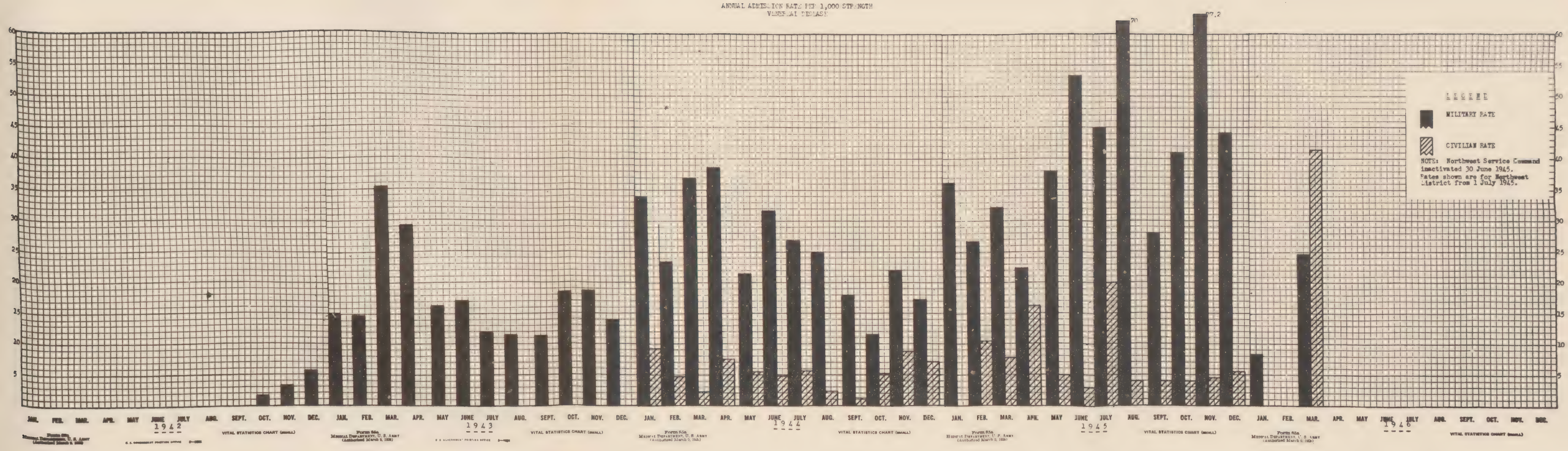
VITAL STATISTICS CHART (SMALL)

Form 52a
Medical Department, U. S. Army

VITAL STATISTICS CHART (SMALL)

NORTHWEST SERVICE COMMAND

ANNUAL ADMISSION RATE PER 1,000 STRENGTH
VENEREAL DISEASE



months are: January 8, February 1, March 12, April 19, May 5, June 1, July 1, August 1, September none, October 1, November 2, December none. Prophylaxis stations are maintained in the Edmonton Area at the Station Hospital, the United States Army Air Base, and downtown Edmonton, jointly with the Canadian Services. Through the cooperation of the armed forces both Canadian and United States with civilian authorities, a system of registration of all women at public dance halls has been instituted in the area and found to be of great value in checking contacts, and in reporting United States personnel contacts to us. Their treatment of civilian contacts, however, has not been as one would wish, that is due to their inability to secure facilities for cultures and also because they have little or no penicillin available.

Cooperation with civil authorities in controlling venereal disease is further treated in the broad control of sanitation in extra cantonment areas as discussed in the first chapter of Volume IV of this history under the title "Extra Military Sanitation and Liaison Activities."

CHAPTER 17

Arthropod-Borne Infections

The insect-borne diseases, including dengue, filariasis, malaria, relapsing fever, typhus fever, sand fly fever, Rocky Mountain spotted fever, tularemia, and any and all other arthropod-vector diseases have been foreign to this Command. In all of the period of occupation of this region of Canada and Alaska no insect-borne disease has been reported.[2]

Malaria presents little or no problem in this region due to the sparsity of anopholean mosquitoes and malaria-infected personnel. An occasional case was seen among civilian employees who had formerly been in the Armed Forces in malarial areas. Some military personnel, also previously infected with malaria in other theatres, have been reassigned here but no active clinical cases have been reported.[3]

One case which clinically resembled typhus was reported from the Haines Area, however, since sufficiently substantial evidence was not manifested, no definite diagnosis of typhus was ever made.

Northwest Service Command Medical Laboratory Technical Memorandum No. 17, dated 20 January 1944. Subject: "Tick Borne Diseases of the Northwest" is appended, the memo was circulated in this Command at that time. There were however no tick borne diseases reported for personnel of this Command. Several cases of Rocky Mountain spotted fever were reported for Canadian civilians, (outside our organizations) in the local press in 1944. These were in the Southwestern section of British Columbia.[8]

In 1943 the history of tularemia in wild rabbits in the Peace River Area caused the Commanding Officer of Camp Prairie to publish an order to all personnel prohibiting the handling, skinning or consuming of wild rabbit. No cases have been reported.[3]

On the whole insects have been a pest problem; the most serious record is the report of several cases of abscess, with no other effect, due to insect bites in the Johnson's Crossing Area. Measures taken to control all species of pest insects common to this area are discussed in the chapter "Control of Insects" of Volume II of this history.[1]

NORTHWEST SERVICE COMMAND MEDICAL LABORATORY
ARMY SERVICE FORCES
SCU 2431, APO 722, GROUP F
c/o Postmaster, Seattle, Wash.

20 January 1944

TECHNICAL MEMORANDUM NO. 17

SUBJECT: TICK BORNE DISEASES OF THE NORTHWEST.

The principal diseases transmitted to man by ticks in the North-West are Relapsing Fever, Tularemia, and Rocky Mountain Spotted Fever.

RELAPSING FEVER

The period of incubation of Relapsing Fever is from two to twelve days, usually five to eight. There may be a prodromal stage of from a few hours to two or three days consisting of headache, loss of appetite, and lassitude.

The onset of this fever is acute with chills, aching of the head, back, and joints, nausea and vomiting. The temperature rises from 90° F. to 103°-104°F. and is accompanied with an increase in pulse and respiration. The temperature remains high from five to six days with often fluctuations of three to four degrees centigrade. During this period there is nausea and vomiting, dry and hot skin, light perspiration, and jaundice. Constipation may ensue, but diarrhea, nose bleeding, and hemorrhages from the intestinal tract, gums, and ears are most often observed. Delirium may be present but rarely stupor. Enlargement of the spleen and albuminuria with rapidly developing anemia is common. Moderate leucocytosis with increase in polys, among which spirochetes are found, is present.

About the sixth or seventh day the patient apparently returns to normal. Within six or seven days after the afrebrile state, relapse again ensues. The symptoms of this second relapse are the same as those of the first, but they only last from three to four days ending with crisis. The third and fourth relapse may occur; very rarely more than four relapses take place. Clinically it is difficult to differentiate between Relapsing Fever, Malaria, Dengue, Smallpox, Influenza, Yellow Fever, and early stages of Plague.

The following procedures are used in the laboratory diagnosis of Relapsing Fever:

(1) Presence of properly identified Spirochetes in the blood during relapse is positive diagnosis of this fever. The spirochetes may be examined by direct wet smear under cover glass, by dark field illumination, by thick or thin smear stained with Giemsa's or Wright's.

(2) Blood from the infected individual is injected intraperitonially in a white rat or mouse. Within four to six days spirochetes can be demonstrated in the blood of the mouse. They are not numerous in the peripheral blood during the first few days of the disease.

Prophylatically the treatment of Relapsing Fever is very simple. The separation of man from the vector by the isolation of all convalescents and the protection of all persons from such vectors as lice and ticks. The therapeutic treatment of Relapsing Fever is best carried out by the use of neo-salvarsan. The first dose is given during the first attack and just before crisis. A second dose is given four or five days after the temperature has fallen. The patient should be kept in bed as there is danger of heart failure or collapse should he get out of bed. Palliative treatment should be given for pains in the joints and muscles.

The diet should be liquid during the attacks, but after they are over, the patient should be fed well as anemia is marked. Fresh air and rest will complete recovery.

TULAREMIA

Tularemia is an infectious disease produced by Bacterium Tularense. The etiological agent is present in infected rodents, especially rabbits. It is secondarily a disease of man, being transmitted from the animal reservoir to man by bite of ticks, (Amblyomman americanum), deer flies, or by handling the bodies of infected rodents, especially rabbits. The incubation period of this disease is from one to ten days. The average period is three and one-half days.

The onset is very sudden and is characterized by chills, headache, vomiting, aching bodily pains, sweating, fever, and prostration. This disease manifests itself in four definite clinical types which are the Ulcero-Glandular, Oculo-Glandular, Glandular, and the Typhoid Type. A pulmonary type might well be included.

Within forty-eight hours after the onset of the Ulcero-Glandular type, the patient complains of pains in the area of the lymph glands which drain the site of infection. These glandular pains are accompanied by swelling of the glands involved, which are only those of the immediate vicinity of the site of infection. These glandular pains are preceded by a papule, usually appearing on the back of the finger, which breaks down and leaves a ragged ulcer.

The area over the infected glands is red. The glands often break down and discharge purulent material.

In about half the cases these glands do not break down, but remain hard, palpable, and rather tender for two or three months, gradually returning to normal. The lymph glands other than regional are slightly infected.

Subcutaneous nodules, varying in size from that of a pea to one centimeter in diameter and numbering from two to thirty, are present on the anterior aspects of the forearm and hand. The nodules are found along the blood vessels from the ulcer on the finger to the axillary glands.

Loss of weight, extreme weakness, recurring chills, sweating, and prostration are characteristic of the active stage which lasts from two to three weeks.

In general the Ocula-Glandular type presents the same symptom as the above mentioned type, except that the primary lesion is in the conjunctival sack instead of the skin.

The papules usually occur on the lower lid. The eye manifests irritation, redness, and shedding of tears. The preauricular, parotid, submaxilliary, anterior cervical, and in severe cases the axillary glands, are infected.

Fulminant cases mostly involving the above mentioned glands on each side have been recorded as being due to the handling of infected cotton tailed rabbits.

The glandular type is characterized by the absence of a primary lesion at the site of infection, also by the marked swelling of the regional lymph nodes. This type resembles the Ulcero-Glandular.

The Typhoid type of Tularemia is chiefly characterized by the absence of a primary lesion and the swelling of the lymph nodes. The general symptoms of this type resemble those of Typhoid Fever. The onset and duration of this type is the same as that of the Oculo-Glandular type.

Fever is always present in all four types of Tularemia. Patients show constantly an initial rise in temperature, remission, and secondary rise. Following the initial rise there is a remission of one, two or three days which is followed by a rise to the original height. After

this there is a gradual decline to normal which may take two or three weeks to gain.

Convalescence of Tularemia is very slow and patients in this stage are unable to work after six months or even a year. This weakness is very characteristic of Tularemia.

Relapses of fever have occurred lasting six to eight days as late as ten months after the patient had apparently recovered.

The clinical diagnosis of Tularemia is easily made, providing the physician will keep in mind the following points:

(1) A history of the patient having dressed a wild rabbit or being bitten by a tick.

(2) A primary lesion of the skin in the form of a papule developing into an ulcer.

(3) Persistent glandular enlargement in the regions draining the primary lesion.

(4) A fever of from two to three weeks duration and of an undulating nature. These things should be kept in mind to prevent the clinician from calling it "flu", septic infection, typhoid fever, or pneumonia; the serologists from calling it undulant fever on account of the cross-agglutination with malitensis and abortus, or typhus because of a high tetre in the Weil-Felix; the pathologist from calling it tuberculosis because of the lesions produced in the lymph glands, and the dermatologists from calling it sportrichosis due to the subcutaneous nodules.

The bacteriological diagnosis of Tularemia is done to verify the clinical diagnosis after the physician has recognized one of the above four points in hispatient. This diagnosis is done in the following two ways:

(1) By obtaining an agglutination of Bacterium Tularense with blood serum taken from the patient not earlier than the second week of illness and noting an increase in the agglutination titre of the serum taken a few days later or on the third week of the disease.

(2) By isolation of Pasteurella tularensis from guinea pigs innoculated with material from the primary lesion, or from the enlarged glands or the blood of the patient. Microscopic examination of cover-glass preparations taken direct from the patient is useless,

After subcutaneous innoculation of the guinea pig, death occurs in five to eight days; post-mortem there is a whitish membrane-like area at the site of innoculation. There is a bubo, generally in the cervical axillary, or inguinal region, containing dry, yellowish, caseous material; the spleen is greatly enlarged, very dark in color and contains yellowish white, discrete, caseous granules up to one M.M. in diameter, projecting slightly above the surface; there are numerous granules in the liver; the lungs are rarely involved. The organisms are present in enormous numbers in the spleen, in smaller numbers in the liver, bubo, and heart's blood.

Prophylatically the treatment for Tularemia is carried out in the following ways:

(1) Cooking thoroughly, especially rabbits, any wild animal used for food.

(2) The use of rubber gloves when working in laboratories where micropsy on infected animals is being performed.

(3) The use of rubber gloves by cooks, hunters, and market men in dressing rabbits.

(4) Use an immune person for dressing rabbits where possible.

(5) Freezing the rabbits for thirty days or longer.

(6) The use of the ordinary disinfectants.

The only treatment for Tularemia is symptomatic. Complete rest in bed is probably the best. Excision or even incision of the glands is not advised until soft places occur in the skin overlying the infected glands. No drug, preventive vaccine, or serum has been found yet.

ROCKY MOUNTAIN SPOTTED FEVER

Rocky Mountain Spotted Fever is an acute, endemic, febrile disease which is transmitted accidentally to human beings by the bite of an infective wood tick, Dermacentor and ersoni.

The prodromal and early symptoms of Rocky Mountain Spotted Fever resemble closely those of the other accute, eruptive, febrile diseases and, as in those, vary in degree, therefore, it is difficult to establish an early diagnosis in the disease. During the progress of this

disease the following symptoms appear; a short prodromal period lasting two or three days during which the patient has a general malaise and chilly sensation. This is frequently followed by distinct chills, pronounced headache, and muscular pains. Rash and rose color eruption are seen early. This rash and rose color eruption occurs on the face, neck, and upper thorax. From twenty-four to forty-eight hours later in the wrist, forehand, ankle, and lumbar region of the back appears the characteristic petechial eruption, which is rose-red in color changing rapidly to dark bluish-red. This is the result of hemorrhages of small blood vessels which will not disappear on pressure. The petechie increase in size, become purpuric and are accompanied by sloughs on the dependent parts of the body in the more severe cases. Not infrequently, the sloughing of the soft palate and scrotum occurs in the human. The tongue has a yellowish white coat and the conjuctiva shows a yellow tinge in the later stages of this disease. Delirium might set in, but the mind is clear to the last. Extreme lassitude is the rule, constipation and albuminuria are common. The temperature is high from seven to ten days in uncomplicated cases, while in complicated cases it may be prolonged. The respiration and pulse is rapid, with the latter out of proportion to the degree of temperature. This is due to toxemia. Convalescence is slow but complete with the temperature dropping rapidly.

The clinical diagnosis of Rocky Mountain Spotted Fever is made from the history and surroundings of the case and the character of the eruptions, and is easily arrived at after petechial eruption has appeared, except in rare cases where the history doesn't exclude possibility of typhus fever infection. In such cases, blood inoculation into guinea pigs will easily establish diagnosis because these two diseases are distinguishable in this animal both by character of lesions and by absence of cross immunization. The history of the tick bite is usually found to occur from three to twelve days previous to the onset of the sickness. When there is no history of a tick bite found, the tick has dropped off; without the knowledge of the patient, the site of the bite is hard to locate; this is the habit of the tick, Dermacentor andersoni. In some cases slightly elevated rose color and macular eruptions appear on the face, neck, hands, and upper thorax before characteristic petechial eruption is visible which may easily be mistaken for measles or early smallpox or other exanthematous febrile diseases.

If careful examination is made, the primary eruptions of Rocky Mountain Spotted Fever will not be confused with early appearing erythemia or the diffused red-bluish of scarlet fever, or with the rapidly changing papules and vesicles of chicken pox, nor with the localized abdominal rose spots of typhoid fever.

In the bacteriological diagnosis of Rocky Mountain Spotted Fever a blood inoculation from the infected individual is made intraperitoneally into a male guinea pig. This brings about swelling of the scrotum and inguinal region of the animal and hemorrhages of the brain which produce death in the animal, in the case of Rocky Mountain Spotted Fever. In the case of Typhus, swelling of the scrotum and inguinal region takes place but the animal never dies, thus differentiating between the two diseases. Agglutination tests using non-specific antigen, proteus X-19, is also used in diagnosing this disease. The same diagnostic test is used in typhus fever. An early high titre with immediate and rapid increase is diagnostic of typhus and differentiates it from Rocky Mountain Spotted Fever which infrequently has this early high titre and rapid increase.

There are three measures which we, as individuals, may use to prevent spotted fever:

(1) Avoid ticks.

(2) Remove ticks from the person as early as possible.

(3) Be vaccinated

On camping trips, if it is necessary to sleep in the open, care should be used in selecting a site for placing the bed as ticks will crawl into a bed laid on the ground. Since ticks are usually most numerous where rodents are most abundant, areas well populated with rodents should be avoided. The safest camping ground is undoubtedly in standing timber where low vegetation is scanty. Proximity to trails and old roads should be avoided. In sage-brush sections, avoid the sage brush. Avoid brushy areas along streams as camping grounds. The dog tick is far more likely to be present along the course of streams than is the wood tick.

Persons should be especially watchful when walking along trails. Ticks tend to concentrate on vegetation along the sides of trails and in the bushes along the edge of wooded areas. Similarly, vegetation along roadsides and grassy strips in the middle of little used roads are often very dangerous. It is especially desirable to watch the clothing when following trails or old roads.

In the prevention of tick bite, the first precaution is the wearing of such clothing as will prevent ticks from getting underneath. This may be accomplished to a considerable extent by wearing high boots, leggings, puttees, or socks that are worn outside the trousers legs.

With such precautions taken, most ticks will crawl up the outside of the clothing and can be removed from the neck when contact with the skin makes their presence known. Passing the hand over the neck occasionally to feel for ticks is a good habit to acquire.

Ticks are far more likely to secure a hold on rough clothing than on clothing of smoother texture. There are advantages in both, however, fewer ticks secure a hold on smooth clothing; but, on the other hand, on cloth with a heavy nap their movements are impeded and are necessarily much slower. If the legs of the trousers are carefully watched, most ticks can be picked off soon after they catch hold.

In spite of precautions, however, a certain number of ticks will reach the body through the various openings in the clothing. It is therefore, important that the above precautions be supplemented by the examination of the inside of the clothing and of the body. Since ticks seldom attach immediately (unless late in the season), and are seldom infectious until after having been attached for a few hours, such examinations made twice each day (early afternoon and on retiring) should ordinarily be sufficient. In heavily tick infested areas, however, or in sections known to be particularly dangerous, more frequent examinations should be made. When retiring, a complete removal of clothing is desirable. Both clothing and body should be examined carefully and, if possible, any clothing not worn at night should be so placed that any undiscovered ticks will be unlikely to crawl from the clothing to the bed. If two or more persons are together, they should assist one another in the examination. If the person is alone, the back and other portions of the body that cannot be seen should be explored with the hands, paying particular attention to the hairy portions.

Ticks may be removed from man and domestic animals with the fingers, but a better plan is to use a pair of small forceps or tweezers. With these the tick may be seized by the head, close to the skin, and easily removed. There is no danger of leaving the ticks head embedded in the skin. Care should be exercised against crushing the tick, as the contents of infected ticks are dangerous. After removing or handling ticks, the hands should be washed thoroughly with soap and water.

Two or three inoculations of the vaccine vive a degree of protection usually sufficient to last through one tick season, but the immunity apparently is not permanent. Occasional cases of spotted fever have developed in vaccinated persons, but the vaccine apparently lessens the severity of the disease and seems to insure recovery. For its full protective value the vaccine should be taken at least 10 days before exposure to tick bite.

/s/ HARRY E. WRIGHT
Lt. Col., M.C.
Commanding

CHAPTER 18

Miscellaneous Diseases

In this group are included a variety of diseases listed in the Statistical Health Report including infectious hepatitis, infectious keratoconjunctivitis, mycotic dermatoses, poliomyelitis, rheumatic fever, scabies, tetanus and fever of undetermined origin. Included also are any other diseases not normally defined in other categories in the Statistical Health Reports.[2]

There were a few cases of infectious hepatitis hospitalized in 1944 and 1945. Most of these were military. No serious sequela were reported.[2]

Single cases of keratitis infection were reported in December 1943, in June, and December 1944, and in November 1945.[2]

Three cases of infectious mononucleosis were reported from the Edmonton Station Hospital in 1944 and six cases from the Whitehorse Area. No serious sequela were reported.[2]

One case of mycotic dermatoses was reported from the Edmonton Area in October 1945.[2]

Five cases of rheumatic fever were reported from the Whitehorse Area for 1944-1945. Three cases were reported from the Edmonton Area in 1943. All of these were military. One was evacuated to Baxter General Hospital. Four military and one civilian cases of rheumatic fever were reported from the Edmonton Area in 1944. Three of the military cases were evacuated to Schick General Hospital.[2]

The Edmonton Station Hospital recorded 2 cases of scabies in 1943, 15 cases in 1944 and 17 cases in 1945. None were reported in 1946.[2]

One civilian and one military case of fever of undetermined origin were reported in 1944.[2]

Canadian health reports indicate that trachoma is a common problem with Indians. A poliomyelitis outbreak occurred in the Province of Alberta in the late summer of 1941. There has been no record of polio in the military establishment.[9]

Routine control measures were taken in control of all infectious diseases as prescribed in existing directives.[3]

CHAPTER 19

Nutritional Disease

A fairly complete and comprehensive picture of nutrition problems in this Command, particularly in the early days of its history when food shipments were complicated by transportation difficulties, is contained in the chapter "Nutrition" in Volume II of this history. At the beginning of operations in this territory food supply was mostly, and necessarily, by means of "C" and "K" rations. However as the overall project progressed and problems affecting food shipments were solved improvements were made in food supply to the point where it was equivalent to the finest in the Army.[4]

The following observation is excerpted from a letter from the Service Command Surgeon to the Surgeon General, dated 3 April 1943:

"One of our hospital units added thiamine chloride to the diet because of lack of confidence in the ration. None of the other troops have received vitamin concentrates. A few units have reported that a very small per cent of the troops have shown evidence of nutritional disturbance due to failure to consume the ration because of its monotony. These troops complained of anorexia, general malaise and loss of weight. There has not been any definite evidence of nutritional disease. The high incidence of dental caries is believed due to excessive consumption of sweets and poor oral hygiene rather than to a dietary deficiency. There has been a slight general gain in weight among members of this Command."

A search of the records indicates a divergence of opinion on the need for supplementing the diet. On the whole the opinion was concurred in by Medical Officers in lower echelons that the diet was adequate from a vitamin standpoint but the monotony of it made it repulsive to many individuals. Consequently in August 1943 the observation in one District was made that, in cold weather, when fresh items are frozen and cannot be used it is advisable to issue multivitamin capsules particularly useful in combating C and B complex deficiencies. It was noted that no specific gingivitis developed in many troops; some of it was believed to be due to lack of vitamin C and B, rather than poor dental hygiene. Such cases cleared up rapidly under improved hygiene with the administration of ascorbic acid and thiamin chloride.[2]

In line with such observations on dental disorders the Command Surgeon reports that the dental health of the Command was good and that the incidence of decay and gingival disorders was not above normal.[1]

Dental Officers estimate that Vincent's Angina was present in military personnel to the extent of two per cent of strength, in civilians, four per cent of strength. Poor dental hygiene was observed most commonly in civilians. In areas with high concentrations of civilians Vincent's occasionally approached epidemic proportions.[3]

It was felt by the dental surgeons that due to the lack of fresh milk, there were in many cases, a marked decalsification in the teeth among those individuals assigned to stations remote from a good supply of fresh milk and vegetables.

The matter of vitamin deficiencies in the Northwest Division, U.S.E.D., as related to contractor employees, was recorded in a letter from the Division Medical Officer, to the Whitehorse District Engineer, dated 29 June 1943:[4]

"1. The subject of vitamin pills is one open to discussion. As a rule the food given to civilians in the Northwest Division is much better than that fed to civilians in the States. The civilians are not on field rations as are the troops in the Northwest Division.

2. In general, it is requested that before vitamin tablets are to be ordered for the contractor or advice given to the contractors on the procuring of vitamin pills, the District Medical Officers and the Division Medical Officer concur."

This policy corralled the tendency toward indiscriminate distribution of vitamins.

The overall picture is one in which vitamin supplements to the ration were almost entirely restricted in this Command. The records show nutritional disease was not influenced thereby, with the questionable exception of oral disorders that were overwhelmingly in existence in more densely populated areas where a full and balanced diet was constantly provided.

CHAPTER 20

Environmental Disease

A broad consideration is given herein to disease caused by environment including a discussion of the recorded findings on psychiatric cases. Also presented are the control measures employed to stimulate a better morale, a healthier attitude to the individual's assigned task, together with the recreational, social and welfare activities that were made available. The effect of climate on personnel is treated with a discussion of frostbite, snow blindness, trench foot and suffocation, and individual protective measures to be taken in combating the unusual climatic conditions.

The physical selection of military and civilian personnel for the cold climate operations in this Command is discussed in the appropriate Chapter of Volume II of this history. Needless to say, the choice of assignment to this region was made by the civilian himself, the soldier went where he was sent, the cold facts as presented to the civilian prior to job acceptance are well illustrated in the following excerpt from "Canol."7

"For construction jobs in remote lands native labor is usually available; for this one there was practically none, because the Indians were few and scattered and, while some acted as guides, dog drivers and river pilots, their usefulness as a group was negligible. Because of Canadian wartime labor restrictions based on a shortage of manpower comparatively few Canadians could be used. So the bulk of the workers had to come from the United States.

Bechtel-Price-Callahan knew that the job would be tough, and in their employment offices from Edmonton to Dallas, and from New York to San Francisco, they posted a sign:

THIS IS NO PICNIC

WORKING AND LIVING CONDITIONS ON THIS JOB ARE AS DIFFICULT AS THOSE ENCOUNTERED ON ANY CONSTRUCTION JOB EVER DONE IN THE UNITED STATES OR FOREIGN TERRITORY, MEN HIRED FOR THIS JOB WILL BE REQUIRED TO WORK AND LIVE UNDER THE MOST EXTREME CONDITIONS IMAGINABLE. TEMPERATURES WILL RANGE FROM 90 DEGREES ABOVE ZERO TO 70 DEGREES BELOW ZERO. MEN WILL HAVE TO FIGHT SWAMPS, RIVERS, ICE AND COLD, MOSQUITOES, FLIES AND GNATS WILL NOT ONLY BE ANNOYING BUT WILL CAUSE BODILY HARM, IF YOU ARE NOT PREPARED TO WORK UNDER THESE AND SIMILAR CONDITIONS

DO NOT APPLY

June 15, 1942 Betchel-Price-Callahan"

In the major hospitals such as Edmonton, Dawson Creek and Whitehorse, a psychiatrist was available for consultation for any men who might be referred for such service. Men with limited adaptability were returned to the States for reassignment or further study, however, every attempt was made to reassign individuals to other types of work more suited to his potentialities. Changing a soldier from one station to another within the Command was often found beneficial.[3]

The Essential Technical Medical Data Reports on neuropsychiatric cases for the period 1 August 1943 to 10 January 1944, are as follows:[2]

On 1 August 1943:

(1) Most of the neuropsychiatric admissions were of the psychoneurotic type averaging 25 per month for the Command. Conversion, anxiety, and reaction depression symptoms were the most prominent. This number was increased by one third whenever new troops arrived from the United States.

(2) Of the true psychosis, dementia praecox was the most common averaging 3 - 4 cases per month.

(3) From 4 - 5 cases of constitutional psychopaths were referred to the hospitals per month, mainly prior to court-martial procedure for a statement of their mental status.

(4) The majority of soldiers presenting psychotic symptoms were basically of a neurotic makeup, which existed prior to entrance in the service. It is believed that lack of recreational facilities, boredom induced by long nights with extremely cold temperatures, military discipline, which in many cases was their first experience in Army life, coupled with home problems were all precipitating factors.

(5) Approximately 65 per cent of all of these cases were returned to duty. Many of these were returned with recommendations to Commanding Officers, stating type of duty the individual was capable of performing. Others were reclassified for limited service within the Command. A very small percentage were recommended for limited service in the United States. The remaining 35 per cent were evacuated to general hospitals in the United States for further observation, treatment and disposition.

(6) The most effective treatment was rest in comfortable surroundings, sympathetic care, special diets, occupational therapy and increase of recreational activities.

(7) It is thought that if more astringent screening was done prior to embarkation that the percentage of psychoneurotic cases would be markedly diminished.

Reports for 31 August, 28 September, 31 October and 1 December 1943 indicate no essential change.

On 10 January 1944; 4 Neuropsychiatric diseases. Policy in effect is to evacuate NP cases to the United States rather than to discharge. This policy is based on WD Circular No. 293, 11 November 1943.

The findings of the psychiatrist assigned to the Edmonton Station Hospital during the full period in which psychiatric service was available at this location, 7 August 1943 to 15 September 1945, were as follows:

Number of Patients Admitted to U. S. Army Station Hospital, Edmonton Alberta, Canada, from date of opening, 7 August 1943, to 15 September 1945 ---------- 4 955

Approximate Mean Strength of Command Serviced by Hospital- 4 175

Type of Case	No. of Admissions
Psychosis	
Manic Depressive and Schizophrenia	5
Alcoholics	8
Psychoneurosis	
Anxiety State	78
Mixed Type	31
Neuresthenia	10
Reactive Depression	6
Conversion Hysteria	5
Obsessive Compulsive (Psychasthenia)	3
Psychopathic Personality	
Emotional Instability (Inadequate Personality)	75
Mental Deficiency	10
Neurologic	4

By 1944 the observation was made that civilian cases were[2] proportionately greater due not only to actual increase in the civilians employed but also to their relatively poor conductions as compared to[1] military personnel. It was noted that general sick calls were heavier when the predominant portion of personnel were civilian rather than military. The incidence of psychoneurotic cases among the civilians can probably be explained on the basis that, due to manpower shortages plus the necessity of obtaining employees at practically any cost, the average civilian available would not meet the standards one would expect under peace time circumstances. There were, of course, many civilian employees of very high type and good phsyical condition but, in general, they were definitely below the military standard.

At every civilian camp and in every Army Post the individual's dominant thought was of home. Mail from home was universally the prime booster of morale.[6]

In the spring of 1943 the first women arrived at Canol Camp and at Johnson's Crossing to work in the contractors' offices. Their presence had a wholesome effect on morale. The men at once took pride in their personal appearance, and only the most luxuriant beards among them were retained. In all of the northern camps the girls set a more enviable record than did the men in the fulfillment of employment contracts.[7]

It was understandable that the enlisted man had plenty of "gripes" about the comparative luxuries furnished the civilian. Yet to accomplish the mission it was clear that special inducements, where such were available had to go to the civilian who could pack up and leave. It is not inferred that every effort was not made to ease the plight of the enlisted man "lost in the sticks." It is, however, a fact that contractors' camps were better equipped than the Army stations and that the routine rigors of Army life were conspicuous by their absence in the civilian establishments. Every effort had to be made to keep the worker on the job; contracts had to be filled, missions had to be accomplished. The morale of civilian employees needed constant vigilance on the part of the military concerned. A typical problem and its solution is demonstrated in the attached memorandum from the Fairbanks Area Engineer to several of the Contractors, subject: "Morale of Contractors' Employees" dated 13 October 1943.[8]

In general the factors that precipitated psychiatric disorders were those that could reasonably be expected in this type of undertaking. Psychiatric problems, such as quoted in ASF Circular 176, 20 October 1943, pertaining to the Army, are also considered typical for our mixture of military and civilian personnel. These include separation from home,

regimentation, lack of freedom, lack of privacy, lack of feminine companionship, a feeling of not being appreciated, and lack of confidence in leaders. Fatigue, danger of death or injury with remoteness of medical care, exposure to cold and isolation were important factors in the early days of the pioneer road. With constantly improving housing, messing, and recreational and medical facilities most of these factors disappeared.

The following organizations and factors contributed greatly to the maintaining of high morale:[3]

Special Services

(a) Movies--Projection machines were distributed to various organizations along the road and movies were available three times a week. The latest pictures were shown.

(b) Athletic equipment was assigned to each organization. Full advantage was taken of any ideal fishing and hunting spots in the territory. The equipment was replaced as needed.

(c) Books--Overseas pocket size editions were added from time to time.

Chaplains Services

Chaplains of all faiths were assigned to the Command and were constantly available for guidance.

Red Cross Chapters were available at the large stations. The main club was located in Edmonton, and provided a place for men to spend the evenings in a wholesome manner.

Morale Meetings

Once weekly every organization was shown a picture of the latest program of the war and various subjects were discussed that were of interest to all concerned.

Furloughs and Leaves

A plan was established whereby every man was permitted 21 days furlough at home, once every 12 months.

In 1944, when all the larger medical installations were in operation the following reports on welfare and social services were obtained:[1]

Station Hospital, SU 2416, Fort Nelson, B. C.

These were provided by both the Red Cross and Special Services Division, ASF, who had ample facilities. Military personnel were given opportunity of frequent trips to Dawson Creek, thereby obtaining some change of scene. A recreation hall was provided and another was available to enlisted men at a nearby air base. Morale, considering the isolation, was good.[1]

U. S. Army Dispensary, Skagway, Alaska.

Special Service's books, magazines, radios, and movies of late pictures are available and shown regularly in the Dispensary. The service club of Skagway opened in November 1942. Local United States Organization opened in May 1943. Shows, dances, various group plans including language studies, photography, and musical appreciation were conducted; and picnics were arranged during the summer. The American Red Cross was well established at this station in June 1943.[1]

Station Hospital, SU 2409, Dawson Creek, B. C.

Recreational facilities were excellent. There were two theaters, one in town and one on the Post, both showing recent features and news. During the summer months a softball league was organized and games were played on three excellent fields on the Post. Other recreational activities were provided, such as archery and tennis. During the winter months, the tennis court was converted into a skating rink. Recreational kits and athletic equipment were distributed by the Army Special Services Division in substantial amounts. In addition to the latter, magazines and periodicals were distributed at regular intervals. The post maintained a library with an excellent selection of books; including many of recent publication. Each organization on the Post had a recreational hall and day room of its own. These were ample in size to hold parties, and were furnished with pool tables, ping-pong tables, chairs and desks.[1]

The American Red Cross was active and cooperative in arranging social gatherings for enlisted men, arranging furloughs, loaning money, helping worried soldiers to obtain detailed news of conditions at home, and other service. Mail service was excellent. Transportation by bus was furnished for personnel desiring to spend evenings in town.

Station Hospital, SU 2432, Edmonton, Alberta.

With the assistance of the Hospital Handicraft Committee of the American Womens Service Club, the ARC Recreation Worker has been able to maintain an active handicraft program. Leather, beads, horn, string, paper, wood and plasticine are among the materials used. This program was maintained purely as a recreation program but upon occasion patients have been encouraged to use certain materials at the request of the medical officers. There is no doubt that benefits other than purely recreational activity have resulted from the handicraft program. One instance of this is a case of a soldier who had lost his right arm, this soldier learned to write, draw, and become very adept with his left hand. Another patient who had lost his power of orientation in his right hand learned to model with clay. Later he was able to join the group making signs for the Christmas party which he printed very well. This program is designed to give pleasure to patients of all classes and to fill the idle hours of those who enjoy a craft-work. An effort is made to find the special interests of the patients and supply them with materials and instruction in line with their interest. The committee of the American Womens Service Club has been coming to the hospital three afternoons each week for the past year and has done a noteworthy job in the field.[1]

Once each month the American Womens Service Club, Visiting Committee, and the ARC entertain the patients in the day room. An hour and a half of entertainment is provided. This is followed by refreshments, games and usually a spontaneous sing song. On this night the committee women take a cart with refreshments to the wards accompanied by the singers and other music for the entertainment of the bed patients. Special Service movies and USO shows are shown in the day room. The day room is furnished with game tables, work bench, piano, radio victrola, library and comfortable lounge furniture.

As much hospital entertainment is taken to the wards as is practical. In addition to the day room entertainment, occasionally musicians or groups of singers visit the wards. The American Womens Service Club, Visiting Committee, visits once a week. The ARC hospital worker visits each ward at least once a day to play games or assist in the hand work of the patients. Every Friday evening she visits all wards with a cart filled with the week's news magazines, and papers and Red Cross supplies. The magazines are supplied by the American Womens Service Club and the Red Cross subscriptions. Each ward had its own party at Christmas.

Through the Red Cross hospital worker, arrangements have been made for the patients to have reserved seats for football, basketball, hockey games, etc. Those patients that can get up and around, are allowed privileges to attend those games.

Station Hospital, SU 2414, Whitehorse, Y. T.

Representatives of the American National Red Cross have very capably handled social service functions for military personnel; in the case of civilians, social service problems are very adequately handled by the local Labor Relations Office and by the personnel departments of the various contracting companies.

Recreation activities and supplies have been very well handled by the American Red Cross and the Special Services Branch. The hospital maintains a well equipped recreation hall with a small but adequate library, motion picture facilities, billiard tables, ping-pong tables, radios and record players.[1]

Due to the adequacy of the clothing issue the incidence of disease due to cold and wet climates was low in spite of the fact that housing facilities were grossly inadequate in the very early days of our establishment here. The situation was such that many men spent the sub-zero weather of the 1942-43 winter in unwinterized tents.[3]

On 1 August 1943 the following observations were made in the Essential Technical Medical Data Reports:[2]

"The climate in the Northwest Service Command has varied from a high of 120°F as in and around McMurray and Peace River last August to a low of -77°F in and around Kluane Lake just north and west of Whitehorse. The mean temperature in and around a belt from Fairbanks, Alaska to Fort Nelson, B.C. was from 64° to 68° in summer to -30° to -50° in winter. In only two or three regions have there been any strong winds or blizzards. The weather on the whole is dry though there are periods of rainy weather particularly in June and the latter part of September. The relative humidity varies from 50 to 62.

The effect of this type of climate upon personnel has not been altogether bad. During the warm months, woolen outer clothing is habitually worn with comfort except in a few locations where khaki is authorized. During the cold months, however, the constant cold is depressing. The fear of freezing and disability therefrom is predominantly present in the minds of personnel and is a strong deterrent to straying from shelter. Men huddled together in the winter months rarely leave a fire for any length of time. Their mental attitude is one of resentment toward the persistant annoyance of the cold and depression from their gloomy surroundings."

Prior to August 1943 frostbite of the extremities in a mild form has been fairly common. Up to that time, however, serious cases requiring amputation had numbered less than six (6) for the entire period in the whole Command, which at one time included 22,000 troops. Subsequent to that time nine cases of frostbite have been reported from the Whitehorse Area and four cases from the Edmonton Area. None of these has required amputation. Trench foot has been a negligible problem. Suffocation, due to carbon monoxide poisoning, resulting from faulty regulation of stoves and ventilation, has not been encountered. No severe cases of snow blindness have been encountered though it is well established that temporary blindness, severe eye strain and resultant headache are common when protective glasses are not used in winter driving. These conditions prevail in overcast as well as in bright weather.[2]

Attached hereto is Whitehorse District, U.S.E.D. Circular Letter No. 73, subject, "Winter Precautionary Measures," dated 16 October 1943, which furnished instructions for the prevention of frostbite to contractors' and District Personnel.

Attached also is a copy of very comprehensive Technical Memorandum No. 16, Northwest Service Command Medical Laboratory dated 24 January 1944, on the subject, "Protection From the Cold in Northern Regions."

WAR DEPARTMENT
OFFICE OF THE AREA ENGINEER
FAIRBANKS AREA
P.O. BOX 1390

In reply refer to AEF 600.111(General)AE 13 October 1943.

Subject: Morale of Contractors' Employees.

TO : Bechtel-Price-Callahan Construction Co., Fairbanks, Alaska.
Metcalfe-Hamilton-Kansas City Bridge Co., Fairbanks, Alaska.

1. It has been called to the attention of this office that there is a great deal of uncertainty among the contractors' employees in this area as to whether work will be shut down when extreme cold weather sets in, the workmen sent home and others brought back next spring. The following clarification of the policy of the District Engineer's office should contribute to increased and maintained higher morale of your employees.

2. It has been communicated to this office from the office of the District Engineer that there has never been any intention on their part to terminate any man because of extreme cold weather, and it is desired to keep each man who is willing to work to the best of his ability as long as there is work to do. It has been determined that the cost of transportation of personnel, subsistence and stand-by time while traveling to the Alaska project and returning, costs the Government on an average of $1000. Therefore, it is much more economical to keep as many men as possible who are satisfactory in their attitude toward and efforts on the job, paying them stand-by time even though there may be periods of several days when they can do no work at all, and many other days on which they may do but a few hours work. In addition to the high cost of transporting employees to their homes, there is the added difficulty of obtaining actual means of transporting them out.

3. It is believed that the transmittal of this information to all of your employees would greatly improve the general morale which is sadly needed in some cases. Emphasis is further placed on the fact that there will be no hesitation or reluctance to terminate any employees who fail to realize and appreciate the Government's idea in bringing them up here to participate wholeheartedly in most important National Defense activities. It is also suggested that in addition to calling the attention of all your employees to this information that you have this letter placed in a prominent place on your respective bulletin boards.

4. This Area office, having local supervision over two combination acts of contractors, is in an excellent position to compare the response of the contractors' personnel in any and all work that is new, or in the future, undertaken.

(s) Kenneth D. Hauser
Kenneth D. Hauser
Lt. Colonel, C. E.
Fairbanks Area Engineer

CC: District Engineer
Irving M. Reed
Claude B. Davidson
Harry E. Jones
F. M. Davis

WAR DEPARTMENT

U. S. ENGINEER OFFICE
A.P.O. 702
SEATTLE, WASHINGTON

NWDWH 16 Oct. 1943

DISTRICT CIRCULAR LETTER NO. 73

SUBJECT: Winter Precautionary Measures

TO: All Concerned

1. There is attached hereto an outline in brief presenting a suggested list of winter precautionary measures to be followed by contractor's employees. With the approach of cold weather, it is believed that rigid adherence to these measures will minimize incapacitation and discomfort.

2. These rules have been drawn up by the Medical Department, at the request of the Labor Relations Branch of this office. It is suggested that information be transmitted by Bulletin, memorandum, signs and posters at every occupied post where employees are located. It is believed proper dissemination of this information will assist in bringing about observance.

For the District Engineer:

s/ VERNE H. SIDNAM,
t/ Verne H. Sidnam,
Captain, Corps of Engineers,
Executive Officer.

1 Incl.-
List of precautions

Distribution:
As per Dist. Cir. Ltr. No. 1

WINTER PRECAUTIONS
"Dos" and "Donts"

A. ACCIDENTS.

Keep warm

B. PREVENTION OF FROSTBITE

1. Clothing

   a. Keep loose and comfortable

   b. Keep clean and dry at all times

   c. Do not sleep in clothes

   d. Do not dress too warm

2. Hands.

   a. Keep woven mittens loose. Cover with gauntlet.

   b. Dry hands well before going outside.

   c. Do not touch cold metal with bare hands or lips.

3. Feet.

   a. Change wool socks DAILY

   b. Do not sleep in socks worn during the day.

   c. Inner soles, if worn, should be between two pair of socks. Inner soles must be kept dry or they will freeze.

   d. Shoes or boots should be sufficiently large to permit freedom of movement of toes. Feet will freeze if circulation is not maintained.

   e. Keep feet warm and dry

4. Head

   a. Whack off the beards.

   b. Use wool cap or parka hood.

   c. Do not breathe through the open, uncovered mouth. In extreme cold, take shallow breaths.

NORTHWEST SERVICE COMMAND MEDICAL LABORATORY
ARMY SERVICE FORCES
APO 722, GROUP F, VEL/ml
c/o POSTMASTER, SEATTLE, WASHINGTON

24 January 1944

TECHNICAL MEMORANDUM NO. 16.

SUBJECT: PROTECTION FROM THE COLD IN NORTHERN REGIONS.

INTRODUCTION

The subarctic and the arctic regions in which our troops at present may operate in winter are characterized by excessively low temperatures at times by prolonged periods of darkness. The number of light hours become less the farther north one is stationed.

Our men coming from continental United States are apt to anticipate the subarctic and the arctic winter with apprehension and misgiving. Ever since childhood they have been psychologized about "The Frozen North," the bleak and barren tundras, the ice packs, and the very extreme and humanly unbearable cold. Men coming from the more southerly and warmer states are more apt to fear the cold weather in northern stations than those coming from the more northerly states.

The misconceptions prevailing about arctic weather arose from the writings and lectures of the early arctic explorers. These explorers indeed suffered intolerably from the cold. They were poorly equipped both in clothing and in food, and they did not follow the ways of the Eskimo in protecting themselves from low temperatures. And then, too, many of the explorers suffered from scurvy. As sufferers from scurvy they developed besides the physical and physiological characteristics of the disease, the typical psychoneurotic manifestations. Those are less of courage and moral stamina, mental and emotional deterioration characterized by gloom, moroseness, pessimism, apathy and a feeling of hopelessness and helplessness. Their bodies became extremely weak and their minds disoriented. They developed a tendency to delusions and exaggerations. Consequently when they wrote about the Arctic, the scorbutic taint which wrecked both body and mind revealed itself in descriptions of heroic and disheartening struggles in an effort to survive the cold. Needless to say those descriptions paint a picture very much exaggerated, a picture which an individual free from scurvy would paint in a truer light. To an explorer in good health the unfriendly Arctic under the same circumstances would become the friendly Arctic.

The later explorers, learning from the mistakes of their predecessors, were better equipped, had a better knowledge of food requirements, and imitated very closely the ways of the Eskimo in withstanding extremely low temperatures. As a matter of fact, the subarctic and the arctic regions are very healthful places to live in all the year round. Regardless of race, color or previous habitation, any one can get along very well in regions of low temperatures. It was a negro, Hanson, who accompanied Peary in 1908 on his final dash to the North Pole.

The subarctic and arctic regions are in truth more healthful than the tropics. There is not a single illness or disease characteristic of cold climates. In the tropics there are many infections and infestations rarely if ever encountered in the temperate zone. We have many diseases described in a textbook on tropical medicine. We have indeed, a "tropical medicine," but no "Arctic medicine."

The North stimulates metabolism and increases the circulation. The North is invigorating. The tropics tend to lower metabolism, and the excessive heat is enervating.

To feel comfortable and warm in the cold regions in which our troops are operating, it is necessary to follow a few common sense rules with reference to food and clothing.

FOOD

Our body is kept warm by food, not by clothing. Food supplies the heat for our body. Clothes keep this heat from dissipating too rapidly, thus preventing losses of heat greater that the body can produce in a given time. The fewer the clothes the greater the heat removed from our body. In the winter-time we attempt to conserve body heat. In the summer we wish to remove body heat. Consequently we wear more clothing in winter than in summer.

We should take during cold weather, sufficient food to compensate for an increased heat requirement. We need about 1500 to 2000 calories more than we consume during the summer. This increase in food consumption is not necessary if we lead an indoor existence in a cold climate. It applies only to those who live outdoors, or who are engaged in work necessitating staying outdoors for a considerable length of time, or who are travelling during the cold weather days.

We should increase our protein intake. Protein has a marked specific dynamic action. The specific dynamic action is a term used in physiology to indicate the fact that certain foods, such as protein, have a marked ability to increase the rate of heat production. In winter we tend to consume more protein food.

Our winter protein needs are best satisfied by meat. The Indians living in the North and the Eskimos living farther North are great meat eaters. They have learned by experience through the ages that a diet predominating in meat protein serves best their biologic needs under the conditions in which they live.

We, as a rule, do not eat sufficient meat. A generation or two ago we attributed all sorts of diseases to meat. Meat was accused of causing kidney disease, gout, rheumatism, and high blood pressure. The Eskimos, who are hearty meat eaters, suffer from none of these diseases. Because of the unjust accusations hurled against meat, people began to eat meat very sparingly. Fortunately the Army ration provides plenty of meat.

Meat besides supplying superior protein with all the indispensable amino acids is an excellent source of iron and copper and is about a fourth as rich as liver in the anti-anemia factor that gives such spectacular results in the treatment of pernicious anemia. This liver factor serves to build red cells, while the iron serves to produce hemoglobin. Four ounces of meat is equivalent to one ounce of liver. Meat is one of the best anti-anemia foods.

People with anemia cannot stand cold weather for long. Even in fair weather anemic individuals are apt to have cold hands and cold feet and may require additional blankets to keep warm while asleep.

Meat is also a very rich source of the B vitamins, such as thiamin, niacin (nicotinic acid), and riboflavin. We should cook the meat rare or medium, preferably rare. Heat applied in the cooking or frying of meat tends to cause destruction of a greater or lesser portion of the B vitamins. Eskimos eat their meat under-done or raw.

We should drink our milk in winter as regularly as we do in summer. Besides being rich in the vitamin, riboflavin, milk is the most valuable source of calcium. We need our daily calcium for balanced muscle control. With insufficient calcium, the muscles of the legs may soon tire especially during walks or marches in cold weather.

We should secure some source of vitamin D, since sunshine in the long winter months may be rare. This vitamin may be obtained from the fish liver oils. Wherever an ultraviolet lamp is present, as in a station hospital, it should not be left idling in a remote room, but should be also put to use to irradiate healthy personnel. The sunshine vitamin helps in the absorption of calcium and of phosphorus, and induces neuro-muscular equilibrium. It is also a great tonic. The long, dark winter days endow individuals with a feeling of gloom, apathy and melancholy. The sun or ultraviolet lamp leads to cheerfulness and optimism and to a feeling that all's well with the world.

We should secure our daily requirement of vitamin C to prevent latent scurvy or frank scurvy, and the symptoms that accompany such condition. Individuals with frank or latent scurvy feel the cold more intensely than those taking sufficient vitamin C.

The need for vitamin C can be satisfied by one glass of tomato juice daily. Citrus fruits may not be available. If no rich anti-scurvy food can be obtained, ascorbic acid (vitamin C) can be taken in pure form, one hundred milligrams in two divided doses being sufficient.

We should not start out, especially if we are going to be exposed to the cold for quite a while, without a hearty breakfast or a hearty meal. We do not supply our automobile with gasoline for power at the end of the journey, but at the beginning of the journey.

CLOTHING

Clothing, as we have already mentioned, conserves heat. In cold weather, however, it is not the body that needs protection so much as a certain of its extremities. We rarely feel the cold in the chest or in the abdominal region. If we could protect our head, our forehead, our face, our chin, our neck, our hands and our feet, we would hardly feel inconvenienced by cold weather, no matter how low the outside temperature and how strong the wind. We must guard especially against the freezing of tips; ear tips, finger tips, toe tips.

Anatomical parts that have poor circulation, such as the ears, are predisposed to frostbite. Anatomical parts to which the blood must travel a great distance to reach, such as the fingers and the nose, are also predisposed to frostbite. By the time the blood reaches those extremities it has lost a great deal of its oxygen and the substances that nourish tissues.

FROSTBITE IS COOLING OF THE SKIN AND SUBCUTANEOUS TISSUE PLUS INTERFERENCE WITH LOCAL CIRCULATION.

Frostbite is occasioned by the freezing of the skin, and the subcutaneous tissue and the peripheral blood vessels. Depending on the severity of the frostbite, the circulation in the affected area may be at a complete standstill. The fluids in the tissues are frozen, and the minute ice crystals within the tissue injure the cells.

The frostbitten part may at first assume a grayish-whitish waxy appearance, oftentimes not accompanied by subjective symptoms, but at times accompanied by local burning and stinging sensation. The affected part may appear as a small superficial plague, or it may be diffusely hard and immobile.

As a result of the cell injury sustained histamine-like substances are released. These substances sooner or later call forth a physiological response characterized by local reddening and flare. Blisters or wheals may appear several days following the exposure. Frostbite resembles a burn in its physiological manifestations.

The tiny blood vessels constricted and the lining or endothelial cells damaged show increased capillary permeability with resulting edema or swelling of the tissues. In severe cases the tiny vessels are filled with clotted blood, and as a consequence the tissues supplied by the vessels suffer from anoxemia, that is lack of oxygen, and from the nutritive material carried by a circulating blood supply. With a deficiency of oxygen, local cyanosis appears. The cyanosis and lack of nutrition finally bring about death of the tissue frostbitten. The final result of a very severe frostbite is necrosis and gangrene of the part affected.

Frostbite differs in severity depending on the lowness of the temperature, the period of exposure, the presence of wind and of moisture. A combination of low temperature and strong wind is far more conducive to frostbite than low temperature alone. Contributory factors, not related to the weather, are con-striction of body parts, inactivity, injury, nutritional deficiencies, and oxygen deficiency. The onset of frostbite varies. It may be gradual or sudden, especially if the face is involved.

Since in frostbite the circulation may be almost at a standstill, keeping up a vigorous circulation in the hands and feet will prevent frostbite and consequent loss through gangrene of fingers or toes.

A vigorous circulation is maintained by keeping the parts warm. Hands and feet must be kept warm by appropriate gloves, stockings, and shoes. We should wear mittens instead of gloves with separate fingers, or fingered gloves covered by mittens. The heat of one finger will have an opportunity of warming its neighboring finger. Circulation may be impeded by tight-fitting gloves and especially by tight-fitting shoes or leggings. Shoes made from fur or felt are better than rubber boots or leather shoes. Constriction due to tight underwear, tight socks, and garters should be avoided. Pack straps when worn should not press on arms or shoulders.

Circulation is increased by motion. Cramped positions and positions in which one posture is maintained for considerable length of time are condusive to circulatory stasis. We should keep moving in cold weather to keep warm. The greater the circulation in any part of the body, the less likely is the danger of frostbite.

We should not rely on a cap and on ear muffs. We should wear a hood that covers the neck and the ears. Eskimos wear a hood with their fur parkas, never expose their ears, and consequently never freeze them.

In case of extreme cold, forehead, chin, and cheeks should also be protected, exposing only the nostrils. A special toque should be worn to cover the face. The forehead may be covered by a fur flap and the hood should be made to cover as much of the face as possible. In case we have not provided for face protection, we could shield our face with the mittened hand.

We should in walking or standing still avoid facing the wind, especially if our face is not covered. A temperature of ten degrees below zero with a brisk wind is far more chilling than a temperature of forty degrees below zero without wind.

COLD METAL IN CONTACT WITH SKIN IS PAINFUL

Goggles padded with fur or wool should be used to cover the eyes. The eyes of some individuals fill with tears on contact with the cold. These tears are apt to form icicles on the eyelashes. Snow itself may settle on the lashes and interfere with vision.

Individuals who have to wear glasses should either cover them with furlined goggles or line with fur the metal parts that come in contact with the skin. Cold metal may cause intense pain. The nose piece especially is most hurtful. The cold part touching the temples also cause pain. Cold metal parts, such as the canteen cap or mouthpiece should not be touched by the bare fingers, lips or tongue. The metal may be at a very low temperature. The skin may freeze immediately to cold metallic surfaces.

For similar reasons snow and ice should not be eaten. The snow and the ice in the North has a far lower temperature than the snow and ice in our home regions.

We should wear a jacket or parka tight around the neck so that cold air cannot drift down the spine or down the front of the shirt, removing the layer of warm air next to our body, and consequently chilling it. The parkas of the northern Indian and of the Eskimo fit so snugly around the neck that not even a finger can be inserted between the neck and the garment.

Clothing so excessive as to induce sweating should not be worn. The perspiration may freeze, and the frozen fluid may hasten frostbite.

Should any portion of our clothing get wet through immersion or perspiration, we should remove the offending garment immediately. We should keep our feet especially dry. Wet socks must be removed at once, no matter how much inconvenience this removal may entail.

WET FEET PREDISPOSE TO FROSTBITE AND TO INFECTION

Wet feet are very dangerous in northern climates. In the first place the moisture may very readily freeze about the feet and cause thereby a greater tendency to frostbite. In the second place, wet feet lower resistance to infections, especially infections striking the upper and lower respiratory tract such as laryngitis, tonsilitis, the common cold, influenza, bronchitis, and pneumonia. One of the classic experiments of Pasteur and his collobarator, Joubert, were to prove that the natural immunity of fowls to anthrax was lost when inoculated animals were immersed to the thighs in cold water and their body temperature reduced.

We must also take special care of the feet with reference to bathing and cleanliness. We must wash carefully between the toes and remove the skin debris lying therein. This debris constitutes good culture medium for bacteria for the organism that causes, "athlete's foot." A clean foot frostbitten is not liable to subsequent infection as readily as an unclean foot.

ALCOHOL SHOULD BE AVOIDED

We should avoid partaking of alcoholic beverages. These give a false feeling of warmth. Actually they lower the body temperature instead of raising it.

Extreme cold tends to have an anaesthetic effect. The combined effects of cold and alcohol tend to numb the senses as to the presence of real danger. Alcohol and very low temperatures constitute a good formula for a quiet and painless death by freezing.

SMOKING SHOULD NOT BE INDULGED IN

The effect of smoking is similar to a physical condition, such as tight shoes or leggings, that causes constriction and consequent cutting off part or all of the blood supply. The smoking of tobacco is known to produce peripheral vasoconstriction especially in the skin in the vast majority of persons that are healthy, regardless of the length of time tobacco has been used. According to Hines and Roth (1938)[1], vasoconstriction as a result of tobacco smoking is accompanied by a marked fall in skin temperature.

1. Hines, E. A., Jr., and Roth, G. M. Effect of Tobacco on blood pressure as Measured by a Standard Smoking Test. Proceedings of the Staff of Mayo Clinic, 1938, 13, 524-526.

FREQUENT WASHINGS ARE DETRIMENTAL

Too frequent washing of the face, hands and feet removes the normal skin oil, which acts as an insulator. The oil on skin may be compared in its action to heat retention as a layer of asbestos. Before starting out on a tour it is even desirable not to wash the face and hands. The Eskimos sometimes oil their faces and hands as a protection from the cold. Swimmers grease their skin to prevent the water from cooling them excessively.

BARE PARTS SHOULD NOT BE UNDULY EXPOSED

Sudden direct exposure of bared parts during extreme cold weather and wind may lead to sudden frostbite.

When urinating it is imperative to protect the exposed parts from wind and to button the clothes as quickly and as carefully as possible.

THE SLEEPING BAG IS ESSENTIAL EQUIPMENT IN THE NORTH

When travelling either on foot, on sled, on train or an aeroplane we must always have our sleeping bag with us. The sleeping bag is the only safe device for a warm, healthy and comfortable rest during the sleeping hours.

It is better to retire before fatigue sets in. Fatigue by causing deep sleep tends to abolish the sense of awareness of extreme cold. Very tired people without adequate protection from the cold offered by proper clothing or a warm shelter are more likely to freeze to death.

CAMPING AND BIVOUACKING REQUIRE SPECIAL PRECAUTIONS

In camping or in bivouacking we should take special care to have sufficient and proper ventilation if we expect to heat occupied quarters. Our natural tendency is to close up everything and stop up every crevice that would bring in the cold air, forgetting that oxygen is used up for breathing and for burning wood, coal, alcohol, gasoline, or kerosene. In the presence of an inadequate supply of fresh air, the carbon in wood, coal, alcohol, gasoline, or kerosene tends to form the poisonous carbon monoxide instead of the harmless carbon dioxide.

CARBON MONOXIDE IS A SERIOUS MENANCE IN THE NORTH

Carbon monoxide has been the cause of illness and even death among the explorers and individuals living permanently in the North. In 1897 Andree, the Swedish airman, and his companions, started in a baloon toward the North Pole. They never returned. A few years ago the bodies of Andree and Fraenkel were found in a tent. The primus stove was found between the bodies. It was still half filled with kerosene and the air valve closed, indicating that the primus stove kept on burning, finally going out because there was insufficient oxygen in the tent to support a flame. Professor Yandell Handerson of Yale University, a foremost authority on carbon monoxide poisoning, and others, as well have studied the evidence, and feel convinced that Andree and his companion died of carbon monoxide poisoning.

Other explorers who suffered from carbon monoxide poisoning while in the Arctic or Anarctic were Amudsen, Stefansson and Byrd. Admiral Byrd nearly lost his life because of carbon monoxide poisioning while he was living in solitude away from his companions.

Guards should be well shielded from the wind and should have available some source of heat, such as a wood fire, a coal or oil stove. A wood fire may be undesirable because it reveals position to the enemy.

Sentries who have to make rounds should be changed very frequently. In extreme weather it may be necessary to have two sentries each alternating every fifteen minutes. One soldier enters upon his sentry duty, while the one relieved goes inside to warm up, get a cup of hot coffee or tea or perhaps some food.

COMPANIONS SHOULD WATCH EACH OTHER FOR FROSTBITE

It is a good idea to watch the face of our companions if it happens to be exposed, since it is oftentimes undesirable and inconvenient to give adequate protection to the face. A whitish, grayish, waxy patch or plaque indicates a frostbitten area, which may not yield the sensation of pain and hence gives no awareness of its presence. In case such patch or plaque is observed, it should be immediately given first aid or definitive treatment for frostbite.

THE INDOOR MAN NEED NOT TAKE PRECAUTIONS

To those who live or work indoors in the arctic or subarctic regions it is important to keep in mind that sleeping quarters, or place of work of recreation, should not be converted into a miniature tropical region by excessive heat. The temperature of living quarters, sleeping rooms and work rooms, should be between 68° and 72° Fahrenheit.

Higher temperatures debilitate and lower resistance to infections of the upper and lower respiratory tract. It is not the cold that produces the common cold, but the change from torrid living rooms, offices, or places of work to the frigid outdoors. Many people make for themselves an artificial torrid zone in which to live during the cold winter months.

To those who live or work indoors it is also important to remember to dress lightly and not to overheat themselves with the inner and outer garments designed for extreme weather.

THE USE OF DRUGS FOR KEEPING AWAKE DURING COLD SPELLS REQUIRES MEDICAL SUPERVISION

Those working or travelling or flying during extreme cold spells may sometimes experience difficulty in keeping awake especially when they begin to feel cold. In an effort to keep awake and to combat fatigue benzedrine sulfate has been recommended. Benzedrine sulfate should be taken only on the advice of a medical officer.

For mental fatigue a five milligram dose is recommended.[2] This dose may be repeated if necessary every six hours. The total number of doses should not exceed six, and the total intake should not be more than 30 milligrams. For physical fatigue a ten milligram dose is recommended. This dose can be repeated every six hours, but the total number of doses should not exceed three, and the total intake should not exceed 30 milligrams.

Benzedrine sulfate is not to be used for a well rested or moderately tired individual. To such an individual benzedrine may prove harmful. Benzedrine is the antidote for fatigue, and fatigue is the antidote for benzedrine. Fatigue and benzedrine make for a normal state; a normal state and benzedrine result in the manifestation of the undesirable effects of the drug, namely, overstimulation. Undesirable effects include excitement, headache, and undue sense of tenseness or uneasiness, and occasionally vasomotor collapse. A ten milligram dose will be well tolerated by an individual in a state of fatigue, while such dose may produce untold effects in the same individual completely rested.

2. Circular letter No. 58, Office of the Surgeon General, Feb. 23, 1943.

To keep awake during extreme cold, a diet high in protein together with caffeine has been found by the writer to be most efficient and without undesirable after-affects. Caffeine is less toxic than benzedrine.

The high protein diet has a tendency to increase heat production (specific dynamic action) and also a tendency to increase energy metabolism. Individuals with a low basal metabolism are more liable to find difficulty in keeping awake especially in cold weather.

Caffeine citrated if a drug is to be used, is to be preferred to benzedrine sulfate. Caffeine citrated is safe in high doses. A single dose by mouth may be as high as 5 grains (225 milligrams). An average dose is 2 to 3 grains.

Caffeine citrated may be taken 3 grains every two hours with a total dosage of 15 to 20 grains for a period of 24 hours. The best way of determining the dosage is to repeat a 3 grain dose when the effect of the previous dose has worn off. It is always a good policy to consult a medical officer before attempting to take caffeine citrated or any other drug.

Black coffee with plenty of sugar serves as a good substitute for the drug. Hot coffee is to be preferred, but cold coffee will do in so far as the effects of caffeine are concerned.

Tea has been found by most Arctic explorers to be even more invigorating than coffee.

Desiccated thyroid and thryroxin have also been used to keep up the metabolism, but these drugs are cumulative in action and should not be used under ordinary circumstances and without first consulting a medical officer.

THE TREATMENT OF FROSTBITE

The treatment, whether first aid or definitive, should not increase the extent of tissue damage. The frostbitten part should therefore not be bent rubbed or even gently massaged. . Cold or frozen soft tissue and especially frozen capillaries are very fragile. Frozen tissue in the laboratory is more easily triturated or reduced to a finer state of subdivision with mortar and postle. Rubbing or even massaging is liable to bruise the tissues and tear the capillaries. As a result of increased injury to the capillaries, the blood supply to the tissues is further impeded or entirely shut off, and gangrene sets in.

Snow or ice should not be used in the treatment of frostbite. The tendency is to rub the snow or ice on the affected part, and rubbing is contraindicated. Furthermore, snow or ice in the Arctic has the same temperature as the surrounding atmosphere. The snow or ice may have a temperature of ten, twenty, thirty, forty or more below zero degrees. Such snow or ice helps to keep the frostbitten part at the low temperature, which in the first place was responsible for the frostbite.

The object to be attained in the treatment of the frostbitten part is to RESTORE THE CIRCULATION. This object is accomplished by THAWING OUT THE FROSTBITTEN PART GRADUALLY.

To repeat, thawing must be gradual. Raising the temperature too quickly causes too rapid expansion of the cold and contracted tissues with resultant injury to the affected part. Exposing the tissues to a hot stove, to an open fire, or to the heat of a radiator may cause severe pain, may increase swelling due to the transudation of fluid, and may increase the extent of tissue damage.

For mild and superficial forms of frostbite the following simple procedure should be followed:

Keep the affected part at rest. If the hand is involved it should be kept in a sling at heart level or slightly above, according to the comfort of the patient. If the foot is involved the individual should lie down, and no walking should be allowed.

Motion increases the local metabolism and brings more heat to the affected part, thereby inducing thawing more rapid than is desirable.

Thaw out the frostbitten part in cool air, that is, in a cool room with a temperature of about 10 to 12 Centrigrade (50 to 53.6 degrees Fahrenheit). Immerse the affected part in water of about the same temperature as above or apply cold cloths immersed in water of about the same temperature. The cloths are not to be used for rubbing or massaging. They are merely placed on the affected part. Water, if not available, may be obtained by melting ice or snow.

When using water immersion or wet cloths, the temperature of the water should be raised at the rate of about one degree Fahrenheit every two minutes until the circulation of the blood has been restored to the affected part. The procedure should be continued until the water reaches body temperature (98° to 99° degrees Fahrenheit).

When the thawing is completed the air about the frostbitten part should have temperature about 20° - 25° Centigrade (68° - 75° Fahrenheit).

Dry heat can also be used. A hot water bottle may be used. The water in the rubber bottle may be raised gradually. Salt can be heated to any desired temperature and the warm salt wrapped in a towel placed about the frostbitten part.

Blisters when present should be let alone, or if necessary pricked with a flamed needle, before water or moistened cloth is applied.

A frostbitten hand can be thawed out by placing it next to the skin in one's armpit or between the thighs, or in the armpit or between the thighs of a companion.

Pain and throbbing are indications that the thawing is proceeding too rapidly. In that event the environmental temperature is lowered by cooling the affected part either by keeping bare and by exposing to cool air, or by exposing the affected part to a draft of air from an electric fan, if such is available, or by wrapping a part in flannel, wool, towels, or sterile gauze, and then gently cooling with an ice bag.

After gradual thawing has been accomplished, wrap the part with absorbent cotton, towel, flannel, or sterile gauze.

For more severe forms of frostbite, with co-existing shock the individual is wrapped in warm blankets and should be given warm stimulating non-alcoholic drinks, such as tea or black coffee.

No heat should be applied directly to the frostbitten area, and no rubbing or massaging of any kind of motion in the affected part should be instituted.

The affected part should not be covered with blankets, but should be slowly thawed out.

Inhalation of oxygen in severe cases is of great value, since it serves to relieve shock and local anoxemia.

Measures should be undertaken to prevent infection. Among such measures are the subcutaneous administration of tetanus and the oral administration of sulfadiazine.

In frostbite of second or third degree after the thawing process has been completed, local application of a powdered mixture of marfanil (4-aminomethyl-benzenesulfonamide) and sulfanilamide has proved effective.[3] The affected part is bathed in warm water, and the mixture thickly dusted upon the wound, which is then covered with vaseline gauze and bandages. Dressings are left untouched for six days. Should they become soaked with discharge, they are changed after four days. When the old dressings are removed the affected parts are bathed with warm potassium permanganate and dried by hot air.

The local application of the sulfonamides shortens therapy by reducing offensive ordors, by hastening the clearing of healing of wounds, by inhibiting secondary infection, and by rendering amputation unnecessary.

In general treatment in the severe cases of frostbite should be conservative since many individuals, especially those of young age, recover without recourse to surgery.

FOR THE COMMANDING OFFICER:

/s/ VICTOR E. LEVINE
/t/ VICTOR E. LEVINE
Major, M.C.
Executive Officer.

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3. Goecke, C. A. Sulfonamide Treatment of Frostbite. Munchener medizinischos Wochenschuft, 1942, 89, 542; Bulletin of War Medicine 1942, 3, 99.

CHAPTER 21

Extra-Military Sanitation and Liaison Activities

Extra military sanitation was carried on in close liaison with all civil agencies concerned in this Command.

In the Skagway-Haines area complete cooperation was maintained with both the Territorial Department of Health and the U. S. Public Health Service in the various health problems including venereal disease contact follow-ups, off-limit restrictions, maintenance of checks on the quality of water supply, sewerage problems, and other allied matters concerning military and civilian health. Similar cooperation was maintained in the Fairbanks area.3,4

Professional prostitution in Alaska is sanctioned, and in other areas loosely controlled, mainly because local health agencies consider it easier to control venereal diseases among prostitutes than among other native contacts over whom they have no control. The Criminal Code of Canada provides for the suppression of commercialized prostitution but contact reports indicate the looseness of enforcement.3

A review of "Reports on Contact of Venereal Disease" (MD Form 140) records indicates close cooperation in contact follow-ups between the Service Command, the U.S.A.A.F., the R.C.A.F. and the various Provincial Departments of Public Health throughout Canada. The principal Canadian source of contact histories is in Edmonton. Close cooperation is maintained with the Division of Social Hygiene of the Department of Public Health.8

In Whitehorse the Provincial Health Officer lacked assistance and was unable to fully cooperate on other extra military problems in sanitation. The Army independently conducted restaurant inspections and all other problems allied therewith. In other towns in this Command cooperative handling of such matters was afforded. In Edmonton a special board was created for the handling of all health problems. The Service Command was represented by the Surgeon for the Edmonton District. Other organizations represented were the U.S.A.A.F., the R.C.A.F., the Canadian Army, the R.C.N., and the Provincial and City Health Departments. Periodic conferences were held in which all matters of mutual interest were acted upon.3,8

CHAPTER 22

Occupational Health

The diseases discussed in volume III of this history are, of course, inter-rated with occupational health to the extent that the occupation required establishment of the individual in an environment conducive to the disease involved. But to isolate the man and the job in the abstract there were no occupations in this Command in which the medical record indicates any abnormal incidence of job-incurred illness or injury. Men engaged in occupations requiring lifting came in with hernias but the numbers were few. Men engaged in activities requiring exposure to cold came in with frostbite but the cases were few. Men doing heavy construction came in with injuries ranging from simple fractures to fractures of the skull but the numbers of such occupational injuries were never out of proportion to the normal expectancy for the work involved. In short, health in all occupations in this Command was good and at no time did the incidence of any disease or injury exceed normal proportions.[3]

There were only two occupations in this Command that gave particular concern to the Medical Department for the health of the individuals involved. These concerned the military and civilian drivers on the Alaska highway and the civilian alkylation operator in the oil refinery.[3]

The problem of dust on the Alaska Highway as it affected the health of the driver, particularly the driver in truck convoys, was one of concern to the medical department from the very beginning. It was appreciated that there was a tremendous dust problem particularly in convoy work. The Northwest Division Engineer, on 27 May 1943, directed that the District Engineers arrange for a representative check by having 25 per cent of the convoy truck drivers operating out of Fairbanks, Whitehorse and Dawson Creek Districts given chest X-rays. On 19 July 1943, in a memorandum to the Division Medical Officer, the Surgeon for the Whitehorse District indicated:

> "Attached hereto and forwarded for your information is a copy of a report submitted 17 July 1943 by Capt. Harold L. Fruitman, Sn. C., entitled "Need for Respirators for Truck Drivers using the Alcan Highway. This office is informed that 8000 of these respirators have been ordered for use by convoy drivers."

A report on the subject stated:

"On July 9, an average section of highway was chosen for the test run. A light pick-up delivery truck was followed for a measured mile at a distance of 50 ft. at 30 m.p.h. A sample lot of dust was collected in a bottle with a 43 mm diameter opening containing 10 cc of water. The bottle was held at arm's length protruding outside of the window of the ambulance at a height of 5 feet from the ground. If one calculates the amount of inspired air as 1000 cc, at the rate of 20 respirations per minute, this equals 0.712 cubic feet of air per minute. At 30 miles per hour one mile's distance equals two minutes time. Two minutes respiration equals 1,424 cubic feet. 76.63 cubic feet of air contains 0.5865 grams; or 7.7 mg of dust per cubic foot of air. On a trip from Whitehorse to Dawson Creek, for example, one would inspire about 7,507 milligrams of dust.

The size of the particles varied from 6 microns to 50 microns. Microscopically, many particles were amorphous in character; others were quite crystalline and translucent; and some had sharp edges.

If one followed a heavy truck for any considerable distance, the amount of dust inhaled would be tremendously increased. It does not take much imagination to visualize the quantity of dust inhaled by convoy drivers after miles of travel. Even if the hairs in the nasal passage maintained a 40 per cent filtering action, the amount of dust that would enter the bronchial passage and the lungs themselves would still be tremendous.

It is the opinion that respirators should be supplied to convoy drivers on the Alcan Highway. The wearing of these respirators should be enforced."

One may question the soundness of the field experiment on dust inhalation and for those who drove thru the endless clouds of dust it was not necessary to have your head extended outside the cab to appreciate the menace. A miner's type of dust mask with a tissue paper filter was obtained and issued. These were effective filters and were used in convoy work. Without convoys the tendency was to leave the respirator off for, though it was small and compact, it did become hot and cumbersome and a moisture trap after a short period of use.[8]

A compensation claim for monilia infection supposedly acquired on the Alaska Highway is cited and discussed in volume III in the chapter entitled "Infections of the Respiratory Tract and Infections Transmitted by Discharges from the Respiratory Tract".[4]

With the installation of the oil refinery at Whitehorse there arose the possibility of occupational impairment of health due to the use of hydrofluoric acid in the alkylation plant. This was brought to the attention of the Service Command Surgeon by personnel of Standard Oil, based on correspondence from Standard Oil of California. The correspondence, including the need for and suggested methods of X-raying alkylation plant operators, is attached hereto. The operators engaged in this occupation were required to wear a complete rubber cover suit. The X-ray work suggested by Standard Oil was accepted and all operators were given the required X-rays at the Whitehorse Station Hospital.[4] The radiologist at the Station Hospital reported, after the closing of the refinery, that no impairment of the health of any of these operators was detected in the course of this occupation. Occasionally, an alkylation plant operator would report for treatment of minor burns of the hands. Such condition was always brought about by carelessness of the individual in neglecting to protect his hands with rubber gauntlets prior to handling equipment in this plant.[3]

UNIVERSAL OIL PRODUCTS COMPANY

Chicago 4, U. S. A.

September 2, 1943

Standard Oil Company of California
Standard Oil Building
San Francisco, California

Attention: Mr. R. G. Follis

Re: Physical Examinations
HF Alkylation Operators
Canol Project

Dear Sirs:-

Your letter to the attention of Mr. H. J. Nobook dated August 11th has been referred to me for reply.

We are recommending to our licensees that they have their HF plant operators periodically examined by x-ray and urinalysis tests. Attached is a memorandum prepared for distribution to our licensees on this subject. We believe that it is self-explanatory.

With particular reference to the urinalyses it may be necessary for the Army Medical Corps to obtain the procedure from the Kettering Institute of Applied Physiology. We understand that this test is an extremely precise one and that most laboratories have had no experience in conducting such tests and/or do not have the necessary facilities. We presume that equipment for taking x-rays will be available.

There is also attached a memorandum prepared by Dr. Hollis E. Potter for the information of the radiologist who is to take the x-ray pictures so that there will be uniformity in the procedure employed.

If you find that tests of this type cannot reasonably be made at periodic intervals kindly let us know and we will discuss your problem with Dr. A. J. Carlson for his opinion as to the next best alternative

measures that should be employed to protect the HF alkylation operators of your Canol project.

If we can be of further service kindly advise.

Yours very truly,

UNIVERSAL OIL PRODUCTS COMPANY

/s/ P. W. WATSON
Service Department
Safety & Inspection Divn.

PWW/gf
Attach.

MEMORANDUM

PHYSICAL EXAMINATIONS OF HF PLANT OPERATORS

Considerable thought and study has been given to the subject of physiological response of chronic exposure to mild concentrations of hydrogen fluoride in the atmosphere at HF alkylation plants. Library research and discussion with HF acid manufacturers have disclosed no conclusive evidence that would give us any apprehension as to the safety of HF alkylation plant operators particularly if they were in normally good health when originally assigned or employed for that service.

We believe it advisable however in our mutual interest to confirm our tentative conclusion that the worker in good health will be unaffected by continuous or intermittent exposure over a long period of time to an atmosphere containing low concentrations of this acid. Furthermore, we are definitely of the opinion that workmen who may have some subnormal or abnormal physical condition, arthritis for instance, should not be employed on HF operation because there is a possibility that such conditions may be aggravated.

In addition workmen with certain physical disabilities should not be employed in this service because discovery at a later date of such disabilities nowise attributable to such employment may be cited innocently or by false intent in a claim for damages - such claim will be difficult to refute or deny without evidence that an injury was existent before employment.

We believe it well also that you have evidence to allay any fears regarding HF exposure.

It is our understanding that x-ray examinations and urinalyses will do much in serving the foregoing purposes.

In view also of the possibility of having excessive concentrations of HF in the atmosphere in and about the HF plant area such examinations may serve as indicators to emphasize the necessity for closer control over leaks and other undesired discharges of the acid to the atmosphere.

We recommend therefore:

First, that prospective HF plant operators be x-rayed so as to have on record the structural bone details in each individual so that by

comparison at any future date slight changes may be detected - studies by an expert to pass judgment as to whether those workmen undergoing a change should be taken off that type of work. Re-examinations are recommended annually.

The Universal operators who are presently assigned to HF plant operation have been x-rayed and it is our intention to do likewise with all of our men subsequently assigned to this service.

Attached is a short memorandum quoting instructions prepared by Dr. Hollis E. Potter, well known radiologist who has x-rayed our men. This memorandum should be given to the radiologist who may x-ray your men so that there will be a common understanding as to the purpose of the x-rays and similarity in the technique employed in taking the films.

If desired you may submit films to us for analysis by Dr. Potter and Dr. A. J. Carlson, internationally known physilogist who has been retained by us in connection with our investigation of HF from a health standpoint.

Secondly, urinalyses are recommended to give an indication of the absorption and discharge of fluorine. These tests should be made every four months.

We have entered into an agreement with Kettering Laboratory of Applied Physiology, University of Cincinnati, to make all tests for ourselves and for our licensees should they desire. It is our understanding that these tests require the services of a biological chemist and require precision technique. Kettering Laboratory has carried on investigation work in connection with HF poisoning and consequently are thoroughly familiar with the test methods required. They will supply the sample bottles and directions for taking samples and shipment to them. Analyses and interpretation of results will be made by the Laboratory in conjunction with Dr. Carlson and other medical men as he may believe desirable.

In accordance with the terms of our agreement with the Kettering Laboratory we have advanced sufficient funds to cover the cost of these tests. It is our understanding that the cost for each test will amount to between $3.00 and $5.00 with the probability that it will be closer to the lower amount provided the number of tests justifies it. After the tests have been made and the cost thereof billed to us we will in turn bill them at the same cost to our licensees. This arrangement we are sure will avoid considerable book-keeping and accounting expense by the Laboratory and by all of our licensees and will effect a saving to all concerned.

Such tests will be made with respect to all Universal operators assigned to HG alkylation plants and we recommend that you likewise have it done with respect to your operators; i.e., the men who will be assigned to regular continuous employment within the so-called acid area of this plant.

Will you please review this subject and let us have your reaction. If favorable to urinalysis tests we will request Kettering Laboratory to send the required number of sample bottles to you with proper instructions upon receipt of word from you.

X-RAY FILMS OF HF ALKYLATION PLANT OPERATORS

Dr. Hollis E. Potter suggests that the radiologist bear the following in mind:

> "Films should be taken through the pelvis, lower spine and chest.
>
> "The purpose of these films is to have on record the intimate structural bone details in each individual, which vary somewhat in the normal, so that by comparison at any future date the slightest changes in density or blurring of trabeculations may be accurately detected.
>
> "With regard to the chest, the pattern films will serve not only to allow early recognition of these changes in the ribs but also such changes in the pulmonary structures as might be considered typical for a linear or nodular fibrosis.
>
> "The minimum requirements for this purpose are four film; one each for chest and pelvis, and two for lower spine made by anterior and lateral projection. The 14 x 17 inch films, used on lower spine, are large enough to include several lower dorsal as well as lumbar vertebrae.
>
> "All bone films should be of such technical quality that they record properly the density and structural details. No formula for this can be prescribed off-hand but it must be entrusted to competent and careful radiologists. The chest films should be made by standard technic at four or more feet distance and in one-tenth of a second or less."

CHAPTER 23

Civil Public Health

Alaska has a Territorial Department of Health and also has a branch of the U. S. Public Health Service. These agencies work independently but close liaison is maintained. Communities with which this Command was concerned in Alaska are primarily dependent on these major services in matters pertaining to public health. It was found that in towns adjoining our installations the diseases of native civilians are similar to those found in the northern United States. Diseases common to white natives include infections of the upper respiratory tract, measles, mumps, chicken pox, diphtheria, smallpox, influenza, pneumonia, the common diarrheas, dysentery, gonorrhea, syphilis and injuries due to climate, such as frostbite. Sporadic flareups of cerebrospinal meningitis, smallpox, the typhoids and poliomyelitis have been reported as well as several cases of undulant fever. Tuberculosis is very common and has been reported as affecting 0.6% of the population per year. The incidence of tuberculosis and venereal diseases has been found exceptionally high among the less isolated Indians and Eskimos.[3]

In Canada public health is administered by the Dominion and Provincial Governments through their respective health departments.[9]

The Dominion Government deals only with such public health matters as are exclusively national, or interprovincial; thus hospitals for members and ex-members of the Armed Forces and other persons for whom treatment is a responsibility of the Department of Pensions and National Health, certain marine and immigrant hospitals and the two lazarettos for lepers are under Dominion administration. In addition, the Dominion Government makes grants to voluntary organizations that are engaged in public health work, notably: Canadian Welfare Council; Canadian National Institute for the Blind; Canadian Tuberculosis Association; Canadian National Committee for Mental Hygiene; Victorian Order of Nurses; Canadian Branch of the St. John Ambulance Association; Canadian Red Cross Society; Health League of Canada.

In general the administration of local public health activities and the establishment and maintenance of institutions are in the hands of the Provincial Governments, under Sect. 92 of the British North America Act, 1867. Under their control, municipalities, societies, and individuals initiate charitable and humane efforts. Important, and

reflecting most clearly the benefits accuring from such work, are the provisions for medical inspection of school children. These are carried out in some cases by the district or sub-district medical health officers, and in others by public health nurses whose activities are confined to their work alone. In addition, expert advice and assistance are supplied free to children, teachers and parents. In many cases dental inspection is provided for.

Public hospitals are the most numerous among health institutions. They are usually erected and supported by municipalities, their actual administration being in the hands of boards of trustees; their revenue, in addition to that provided by the municipalities, is derived from grants from the Provincial Governments, donations of individuals and societies, and fees paid by patients. Admission and treatment are free of charge to all deserving applicants whose resources are so limited as to prevent them from receiving proper medical attention otherwise; it is generally expected of others that payments for services shall be made in proportion to costs and their ability to defray them. Such public hospitals include isolation and maternity hospitals, tuberculosis sanatoria, etc.

In Alberta the Department of Public Health administers all public health matters in the Province and includes the following Divisions: Communicable Diseases; Sanitary Engineering and Sanitation; Public Health Education; Laboratory; Public Health Nursing; Municipal Hospitals; Hospital Inspection; Social Hygiene; Vital Statistics; Mental Hygiene; Dental Hygiene; Child Welfare; and Cancer.[9]

The following institutions are administered by the Department: Central Alberta Sanatorium; the Provincial Mental Hospital, Ponoka; the Provincial Training School, Red Deer; the Provincial Auxiliary Hospital, Claresholm; the Provincial Auxiliary Hospital, Raymond; the Provincial Mental Institute, Edmonton.

Free clinics for venereal diseases are maintained in the four principal cities and in the two provincial gaols. Educational work on social hygiene is carried on by means of lectures, moving pictures, bulletins and radio talks.

Free treatment for infectious types of tuberculosis is provided for any bona fide resident, i.e., for any person who has resided in the Province for at least one year immediately preceding admission for treatment in the sanatorium.

Under the authority of the Poliomyelitis Sufferers Act, 1938, provision is made for the free treatment in special hospitals of patients suffering from the disease. Provision is also made for academic instruction, vocational training, and rehabilitation of those suffering from paralysis resulting from this disease.

The Department of Public Health has taken the first steps in connection with the inauguration of a cancer service in the Province. Diagnostic cancer clinics have been established in Edmonton and Calgary and are conducted weekly. Provision has been made whereby patients referred to the diagnostic clinic by their own physicians, who are examined by the clinic and found to require deep X-ray or radium therapy or surgery, are treated free of charge.

In British Columbia the Provincial Health Officer, responsible to the Provincial Board of Health, administers the laws relating to public health in British Columbia and carries out the policy laid down by the Minister. Six Divisions and two Bureaus supply specialized services; the Divisions of Tuberculosis Control, Venereal Disease Control, Laboratories, Public Health Engineering, Public Health Education and Vital Statistics; and the Bureaus of Administration and of local Health Services.[9]

Government clinics for diagnosis and treatment are operated at Vancouver, Victoria, New Westminister and Trail while consultative services and free drugs are supplied to private practitioners throughout the Province.

Under the Bureau of Local Health Services contact is maintained with the numerous local health services, such as Public Health Nursing, local Health Officers, School Medical Services and Health Units. The Health Unit is accepted by Public Health authorities as the answer to the problem of providing adequate local health service within the means of the local taxpayers. In British Columbia Health Units are responsible for all the generalized public-health activities and are the media through which the specialized provincial health services are translated into action for the people. Public Health Nurses serve most parts of the Province and, together with Health Units and full-time city health departments, close to 90 per cent of the population. The funds to establish such full-time Health Units are provided from both the School Boards and councils of the component communities and from the Provincial Government. The grants from the Provincial Government are made from two separate Departments. The Provincial Board of Health makes a grant for the entire Health Unit, while the grant from the Education Department is given in consideration of the Public Health Nurses of the Units who undertake the accepted school health program.

Because of the sparsity of the population in the Yukon and Northwest Territories public health matters have been of comparatively little concern in these territories. For the most part, public health measures are directed by municipal governments. However, where matters affect the general public health, they are administered under the direction of the national health service of the Dominion Government. The Medical Officer at Whitehorse indicates that there are only two physicians in the whole Yukon Territory at the present time (1946). He, himself receives a salary from the National Department of Indian Affairs and has his private practice. He operates a 25 bed General Hospital which is financed by the town on a non-profit basis, with some financial assistance from the Territory.[8]

The disease problems in Western Canada closely parallel those in our northern States. Vital Statistics for the Yukon and Northwest Territories are meager but, for all the provinces concerned, what information is available indicates that morbidity and mortality rates compare favorably with those for the United States. The incidence of the acute contagious diseases particularly scarlet fever, cerebrospinal meningitis, diphtheria and measles is somewhat higher than in the United States. Tuberculosis, the pneumonias and influenza are the principal causes of death. In the late summer of 1941 poliomyelitis was epidemic among the civilians of Alberta. Tuberculosis has been found to be particularly common amongst the Indians and Eskimos.[9]

The control of venereal disease is in the hands of the Provinces but liaison is now maintained with the Department of National Defense. Syphilis and gonorrhea are the major venereal diseases though chancroid is also encountered. The Canadian rates for the two major venereal diseases are somewhat lower than in the United States. In general control measures are akin to those employed in the United States.

Sporadic reports of the following diseases have been reported for western Canada: typhoid fever, equine encephalomyelitis, Rocky Mountain spotted fever, tick paralysis, trachoma (common among native Indians), and echinococcus. Malaria, yellow fever and endemic and epidemic typhus fevers have not been reported.

Greatly enlarged war production caused a large influx of people to the cities. This caused a heavy taxing of water supply, sewage disposal, housing and entertainment facilities in settled extra cantonment areas. However this had little or no effect on troops since all such facilities were supplied by the Army, excepting in Edmonton where local water and sewerage facilities were used without any deleterious effect on the local populace. For the most part local sanitation was vastly improved by the establishing of new facilities or the augmenting of existing facilities by the U. S. forces.[8]

CHAPTER 24

Foreign Quarantine

The Canadian National Health Service has a Division of Quarantine, Leprosy, Immigration Medical, Sick Mariners and Marine Hospitals. The Quarantine Section has for its objective the prevention of entry into the country, by water, land or air traffic, of quarantinable diseases, including plague, cholera, yellow fever, smallpox and typhus. It has the added responsibility of vermin and rodent control of vessels. Quarantine Stations are established at St. John's, N.B., Halifax, N.S., Quebec and William Head, B. C. The Immigration Medical Section passes on the mental and physical acceptability of prospective immigrants.[9]

Diplomatic approval of the projects undertaken by this Command was initiated on 16 February 1942 by the Canada-United States Permanent Joint Board on Defense. Construction of the Alaska Military Highway was recommended by the Permanent Joint Board on 26 February 1942, and was approved by Canada on 6 March of that year. Each government assumed certain obligations to insure expeditious completion of this project. The Government of the United States agreed to make the necessary surveys and to construct a pioneer road by use of Army Engineer troops; to arrange for the completion of the highway under contracts made by PRA with Canadian and American contractors; to maintain the highway for the duration of the present war and six months thereafter unless the Canadian Government should prefer to assume maintenance of the section in Canada at an earlier date, and at the conclusion of the war that part of the highway which lies in Canada should become an integral part of the Canadian highway system but no discrimination shall be exercised against United States civilian traffic. The Canadian Government agreed to acquire the necessary right of way to Canada; to permit the procurement of timber, rock, and gravel from crown lands for use on the highway; to waive import duties and other transit charges on shipments from the United States to the project and over the project to Alaska; to facilitate admission of United States residents employed on the project in Canada with the understanding that repatriation of such employees would be the responsibility of the contractors or the United States Government.[6]

The War Department assumed responsibility for all quarantine measures concerning Americans in accordance with pertinent provisions of AR 40-210, WD Circular No. 276, 1 November 1943, and all other applicable regulations and directives.[3]

Military personnel entering this theatre from the United States are required to be free of infectious disease and to have up to date immunization registers covering the typhoids, tetanus and smallpox. No other immunizations are required. Civilian personnel have been

required to have pre-employment physical examinations prior to departure from the United States. The necessary immunizations are also to be obtained. All military personnel with infectious diseases are either held for treatment or evacuated and treatment is continued at the next post. All military personnel with quarantinable diseases are quarantined in compliance with Canadian requirements. Civilian personnel returning to the United States are given a termination physical examination prior to departure from this Command. Terminations are disapproved for those showing indications of infectious disease pending the running of the course of the infection. The only Americans beyond Army control are those who visit the Command but are not employed. This group includes dependents of military personnel.[3]

The Alaskan Division, ATC, also requires an examination of all military and civilian personnel prior to permanent change of station, temporary duty, leave or furlough to within the continental United States. A copy of this certificate is appended hereto.[3]

Dogs and other pets are permitted return to the United States on presentation of the certificate of a licensed Canadian veterinarian or a veterinary corps commissioned officer indicating that the animal has been examined and found free of all symptoms of infectious disease. Immunizations are not required.[3]

S/2922

1452nd AAF BASE UNIT, ATC
APO 462, c/o PM, MINNEAPOLIS, MINNESOTA
OFFICE OF THE SURGEON

Date _____

C E R T I F I C A T E

This is to certify that, in accordance with W.D. Circular No. 276, 1 November 1943, W.D. Technical Bulletin (TD Med 2), 3 January 1944, ATC Memorandum 25-11, 18 May 1945, and ATC Regulation 25-4, 20 February 1945, (the Officer, enlisted man, or civilian) whose name appears above was given a medical inspection, this date, prior to (permanent change of station; temporary duty; leave; furlough), to within the continental United States. The examination revealed no evidence of communicable disease, vermin infestation, or neuropsychiatric disorder.

The Immunization Register is up to date except as noted below.

_____
Medical Corps.

CHAPTER 25

Appendix A. Chronology

1. On 14 February 1942, the Chief of Engineers was notified by the Adjutant General to undertake construction of highway from Fort St. John, Canada to Big Delta, Alaska and to arrange with the Public Roads Administration to follow engineer troops to improve road, construct permanent bridges and complete the project.

2. Diplomatic approval for project was initiated on 16 February 1942 by the Canada-United States Permanent Joint Board of Defense.

3. Brigadier General (then Colonel) William M. Hoge was placed in charge of the project.

4. The project was set up in two parts with principal headquarters Northern Sector, in Whitehorse, Y.T., and headquarters of the Southern Sector in Fort St. John, B.C. Due to communication and other control difficulties the Chief of Engineers assigned Brigadier General (then Colonel) James A. O'Connor to command the Southern Sector.

5. In March 1942 the 35th Combat Engineer Regiment was the first to arrive in the Southern Sector.

6. The 18th Combat Engineer Regiment was first to arrive in Whitehorse approximately 3 April 1942.

7. The War Department assigned the Canol project to the Corps of Engineers in April 1942.

8. Contract for construction of crude oil pipeline and refinery and petroleum facilities entered into on 4 May and executed on 20 May 1942 between War Department and Bechtel-Price-Callahan.

9. The Station Hospital Whitehorse was activated on 8 August 1942.

10. The Station Hospital Fort St. John was established on 12 August 1942.

11. Brigadier General C. L. Sturdevant, Assistant Chief of Engineers, established functions to be performed by P.R.A. with Mr. Thomas H. MacDonald, Commissioner of the Public Roads Administration.

12. The Public Roads Administration arranged with five management contractors to expedite mobilization of civilian contractors.

13. The Northwest Service Command was established by War Department General Orders No. 44, 4 September 1942 for the purpose of coordinating all activities. Brigadier General Hoge was reassigned to the Armored Forces and Brigadier General O'Connor was placed in Command.

14. Contact between Engineer troops of Northern and Southern Sectors was made on the Alaska Military Highway on 24 September 1942, 305 miles west of Fort Nelson. First pilot truck run from Dawson Creek to Whitehorse was made on 1 October 1942.

15. Colonel W. F. VonZelinski, MC, arrived in November 1942 to serve as Chief of Medical Branch, Northwest Service Command.

16. The Northwest Division was established 14 November 1942 with the responsibility for all construction, maintenance and repair of the Alcan Project under the Commanding General, Northwest Service Command.

17. Alaska-Whitehorse Section was formally opened on 20 November 1942. First convoy from Dawson Creek to Fairbanks left Whitehorse 19 November and arrived in Fairbanks 22 November 1942.

18. Construction of the Whitehorse Refinery was begun in April 1943.

19. On 15 April 1943, Brigadier General Ludson D. Worsham was assigned to command the Northwest Division, U.S.E.D.

20. Early in 1943, Lt. Colonel E. M. Sirlin, MC, was designated Division Medical Officer and started organization of medical activities for the Northwest Division. The medical mission U.S.E.D. Health Service, Northwest Division was then set forth in Northwest Circular Letter No. 39, 27 February 1943.

21. In 1943 the Public Roads Administration carried on the construction of the all weather highway.

22. In the early part of 1943 numbered Station Hospitals, communications zone type in tents and portable huts were stationed in the Mackenzie Valley to render medical service on the Canol Project. The 44th with 50-beds was established at Waterways; the 45th with 50-beds was established at Fort Smith; the 46th with 25-beds was established at Norman Wells. These were formed by medical detachments of service units working that area.

23. The first patients were admitted to the Station Hospital, Edmonton, Alberta in August 1943.

24. The Northwest Service Command Medical Laboratory was activated on 5 August 1943.

25. The Station Hospital, Fort St. John was inactivated 1 September 1943 and the Station Hospital, Dawson Creek was activated on the same date.

26. War Department General Orders No. 15, 23 March 1943, established the duties and mission of the Commanding General, Northwest Service Command.

27. The all weather road (Alcan Highway) was completed 13 October 1943. Permanent bridge work, due to material shortages in 1943, was not completed until October 1944.

28. Station Hospital Skagway was activated 16 December 1943.

29. The Station Hospital, Chilkoot Barracks was taken over by the Northwest Service Command from the U.S.E.D. at 2400 hours 31 December 1943.

30. The last elements of the United States Public Health Service left this command on or about 1 January 1944. All medical facilities of Public Road Administration were absorbed by the U.S.E.D. Health Service.

31. The Whitehorse Refinery was completed in January 1944.

32. Colonel Charles R. Mueller, MC, was assigned to the Northwest Service Command as Surgeon, on 26 February 1944.

33. The Station Hospital Chilkoot Barracks was inactivated on 27 January 1944 and established as a dispensary until 1 June 1944.

34. The program of "Curtailment of operations and reduction in personnel and equipment, Northwest Service Command," was instituted pursuant to letter Hq., ASF, SPAOD, subject as above, 10 February 1944.

35. On 16 February 1944 the main Canol pipeline was completed. Crude Oil reached the Whitehorse Refinery exactly 2 months later.

36. Brigadier General Ludson D. Worsham, Division Engineer, Northwest Division assumed additional command of the Northwest Service Command on 19 February 1944.

37. War Department General Orders No. 13, dated 18 February 1944, rescinded War Department General Orders No. 44, 1942 excepting for that portion thereof establishing the Northwest Service Command.

War Department General Orders No. 13, defined the territorial limits of the Northwest Service Command, rescinds Section 1, War Department General Orders No. 15, 1943 and redefined the mission of the Commanding General, Northwest Service Command.

38. Hq., N.W.S.C. moved from Whitehorse, Y.T., to Edmonton, Alberta 24 February 1944 by authority of General Orders No. 13 Hq., N.W.S.C. 24 February 1944.

39. Northwest Service Command General Orders No. 17, 2 March 1944 consolidated Northwest Division and Northwest Service Command under the Commanding General, Northwest Service Command.

40. The U.S.E.D. Health Service of the Northwest Division was abolished on 2 March 1944 upon the amalgamation of facilities.

41. The Station Hospital Fort Nelson was disbanded on 18 March 1944.

42. The Northwest Service Command Medical Laboratory was inactivated 2400 hours, 31 March 1944.

43. Medical Officers of the U.S.E.D. Health Service, Northwest Division were relieved by the Chief of Engineers and transferred to the Northwest Service Command on 29 April 1944. Absorption of medical department personnel and facilities of the U.S.E.D. Health Service was not conpleted until about 1 July 1944.

44. Brigadier General F.S. Strong, Jr. (then Colonel, CE.,) assumed Command Northwest Service Command on 6 May 1944. General Strong replaced General Worsham who was ordered to Washington, D.C.

45. The Station Hospital Skagway made a physical change to the U.S.E.D. facilities as a 35-bed hospital on 12 June 1944.

46. The 46th (numbered) Station Hospital at Norman Wells was reduced to Dispensary status on 1 August 1944.

47. Headquarters Northwest Service Command moved from Edmonton, Alberta to Whitehorse, Y.T., 15 August 1944 by authority of General Orders No. 56, Hq., Northwest Service Command, 14 August 1944.

48. The Station Hospital Skagway, was reduced to dispensary status on 15 October 1944.

49. The Station Hospital Dawson Creek, was closed on 25 October 1944 and a dispensary was established this date.

50. The Dawson Creek Dispensary was closed 15 December 1944.

51. The Camp Canol Dispensary was closed 17 March 1945.

52. The Norman Wells Dispensary was closed 17 April 1945.

53. The Skagway Dispensary was closed in June 1945.

54. Effective 2400 hours, 30 June 1945, the Northwest Service Command was inactivated and became the Northwest District of the Sixth Service Command. War Department General Orders No. 50, 28 June 1945, activated the Northwest District, with Headquarters at Edmonton.

55. General Orders No. 1, Hq., Northwest District, Sixth Service Command, established mission of the Northwest District, announced service units, and designated Colonel Carleton M. Clifford, CE, as Commanding Officer, Northwest District.

56. Lt. Colonel Jesse W. Bowers, MC, was assigned to this Command and designated District Surgeon 28 July 1945 and assumed the additional duty of Commanding Officer, Station Hospital, Edmonton, 29 October 1945.

57. On the departure of Lt. Colonel Bowers, MC, Captain Ferdinand A. Salzman, MC, was designated Surgeon and Commanding Officer U. S. Army Dispensary, Edmonton, 20 April 1946.

58. The Whitehorse Station Hospital unit was inactivated 1 April 1946.

59. The Edmonton Station Hospital was reduced to Dispensary status 1 April 1946.

CHAPTER 26

Appendix B. Roster

The number of officers assigned to the U.S.E.D. Health Service, Northwest Division and the number of officers and enlisted men assigned to the Northwest Service Command and the Northwest District varied appreciably but kept somewhat apace with the overall strengths of the organizations. An a ttempt is made below to list the rosters as of time of peak medical strength of each District or facility.

The roster of medical officers on duty with the U.S.E.D. Health Service, Northwest Division as of 31 January 1944 follows:

DIVISION MEDICAL OFFICERS, EDMONTON

Sirlin, Edward M. - Lt. Col. - 0-293594 (MC)	Chief Health Officer
Babers, Henry J., Jr. - Major - 0-344368 (MC)	Asst to Div Med Officer
Reardon, Edward R. - Major - 0-393257 (MC)	Asst to Div Med Officer
Booke, Harley C. - Captain - 0-503296 (SnC)	Sanitary Officer
Haskel, Samuel E. - Captain - 0-345322 (MC)	Asst to Div Med Officer
Wood, Harry E. - Captain - 0-447817 (DC)	Dental Officer
Cartnick, Edward N. - 1st Lt. - 0-477143 (MC)	Asst to Div Med Officer
McIntyre, John C. - 1st Lt. - 0-517878 (SnC)	Sanitary Engineer
Nevins, ThomasF., Jr. - 1st Lt. - 0-473300 (MC)	Asst to Div Med Officer
Sorbel, John L. - 1st Lt. - 0-504101 (SnC)	Sanitary Engineer
Spencer, Eugene A. - 1st Lt.-0-1543876 (MAC)	Med. Admins. Officer

DISTRICT MEDICAL OFFICERS, DAWSON CREEK

Brown, Joseph R., Capt. - 0-362810 (DC)	Asst Dist Med Officer-Dental
Evans, Orville T., Captain - 0-1685138 (MC)	Dist. Medical Officer
Hill, John R. - Captain - 0-419001 (MC)	Asst. Dist Med Officer
Manning, Frank G. - 1st Lt - 0-532501 (SnC)	Dist Sanitary Officer
Schmid, John F. - 1st Lt. - 0-505844 (MC)	Asst. Dist. Med Officer

DISTRICT MEDICAL OFFICERS, EDMONTON

Ergenbright, Willard V. - Capt. - 0-469263(MC)	Asst to Dist Med Officer
Gajewski, Matt A. - Capt. - 0-381703 (MC)	Asst A.M. Officer Fld A. #5, Cp Canol
Potsubay, Samuel F. - Capt. - 0-478824 (MC)	Asst Dist Med. Officer w/sta Cp Canol
Toppenberg, David R. - Capt. - 0-371778 (MC)	Asst to Dist Med Officer
Weiner, Leo - Captain - 0-423458 (MC)	Dist Med Officer

DISTRICT MEDICAL OFFICERS, EDMONTON (Cont'd)

LaFond, Robert - 1st Lt. - 0-437967 (MC)	Area Med. Off. Fld Area #4
Lester, John W. - 1st Lt. -0-489594 (SnC)	Dist Sanitary Officer w/ sta Camp Canol
March, Edgar J. - 1st Lt. - 0-524282 (MC)	Asst to Dist Med. Officer
Pertezman, Nathan - 1st Lt. - 0-1685888 (DC)	Dental Officer, Cp Canol
Marucci, Washington L. - 2nd Lt. - 0-1534802(MAC)	Cp Canol, Fld Area #5

DISTRICT MEDICAL OFFICERS, FAIRBANKS

Schochet, George - Major - 0-399348 (MC)	Asst Dist Med Officer
Bogost, Meyer S. - Captain - 0-461392 (SnC)	Sanitary Officer
Dodge, Richard S. - Captain - 0-474040 (MC)	Dist Medical Officer
Baird, Raleigh W. - 1st Lt. - 0-470305 (MC)	Asst Dist Med Officer
Hoffman, Benjamin M. - 1st Lt - 0-399621 (DC)	Dental Officer
Peterson, John W. - 1st Lt. - 0-419700 (MC)	Asst Medical Officer

DISTRICT MEDICAL OFFICER, PRINCE RUPERT

Jackson, Raymond S. - 1st Lt. - 0-419187 (MC)	District Medical Officer

NORTHWEST DIVISION SUB-OFFICE, SAN FRANCISCO, CALIFORNIA

Hiles, Homer L. - Captain - 0-447342 (MC)	Examining Officer
Solter, Nathan - Captain - 0-379657 (MC)	Examining Officer

MINNEAPOLIS, MINNESOTA

Moody, Frank S. - 1st Lt. - 0-474106 (MC)	Medical Officer

DISTRICT MEDICAL OFFICERS, WHITEHORSE

Gordon, Harold L. - Major - 0-369244 (MC)	District Medical Officer
Budge, Paul L. - Captain - 0-465679 (DC)	Asst to Dist Med Officer
Fruitman, Harold L. - Captain - 0-309472(SnC)	District Sanitary Officer
Gliebe, Francis J. - Captain - 0-489198 (DC)	District Dental Officer
Hesson, Herbert H. - Captain - 0-508331 (SnC)	Asst Dist Sanitary Officer
Hathaway, Elwood N. - Captain - 0-404428 (MC)	Skagway Area Med Officer
Larkin, Edward A. - Captain - 0-378107 (MC)	Asst to Dist Med Officer
Ponnoyer, James - Captain - 0-426135 (MC)	Asst to Dist Med Officer
Ash, Henry T. - 1st Lt. - 0-439919 (MC)	Asst to Dist Med Officer
Bansmer, Gustav - 1st Lt. -0-469365 (MC)	Area Med Off, Haines Area
Biehn, Donald M. F., - 1st Lt - 0-524202 (MC)	Asst to Dist Med Officer
Caldwell, Jesse B. - 1st Lt - 0-480801 (MC)	Asst to Dist Med Officer
Plaut, Julian L. - 1st Lt. - 0-297627 (MC)	Asst to Dist Med Officer
Powell, Grover C. - 1st Lt - 0-500982 (MC)	Asst to Dist Med Officer

The roster of medical officers on duty with the Northwest Service Command at the time of peak medical strength of each facility was as indicated below:

HQ., NORTHWEST SERVICE COMMAND AS OF 15 FEBRUARY 1944

Mueller, Charles R. - Col. - 0-10400 (MC)	Chief Medical Branch
Svare, Carroll S. - Major - 0-22313 (MC)	Asst to Chief, Med Branch
Mukensnable, Fred T. - 1st Lt. 0-1533409 (MAC)	Medical Supply Officer
Rowland, Robert L. - 1st Lt. 0-1546068 (MAC)	Administrative Officer
Austin, Edward G. - Major 0-21046 (DC)	Chief, Dental Section
Bills, William E. - Major 0-23682 (VC)	Chief Serv Comd Vet Sec (DS Edn)
Gregg, Merwin J. - Capt - 0-367517 (VC)	Asst to Chief, Vet Sec (DS Edn)
Maxey, Howard C. - Capt - 0-306238 (VC)	Asst to Chief, Vet Sec (DS Edn)
Key, Joseph B. - Capt - 0-380339 (VC)	Asst Serv Command Vet (DS Edn)
Bourne, Holbrook A. - Capt. 0-513667 (SnC)	Chief, Sanitary Sec. Med Br.
Higgins, Margaret R. - Capt. N-703644 (ANC)	Chief, Nurses Sec Med Br.

STATION HOSPITAL, WHITEHORSE, AS OF 30 APRIL 1944

Budge Paul B. - Capt. - 0-465679 (DC)	Dental Officer
Durham, Everett W. - Capt. - 0-421619 (MC)	Chief of Medical Service
Eginton, Charles T. - Capt. 0-1700835 (MC)	Chief of Surg. Service
Jirovec, Donald J. - Capt. 0-479801 (DC)	Dental Officer
Kendle, Walter E. - Capt. 0-206877 (DC)	Oral Surgeon Dental
Law, Stanley G. - Capt. - 0-467342 (MC)	Medical Officer Gen Duty
Lewis, Walter G. - Capt. - 0-369164 (MC)	Medical Officer Gen Surgery
Plaut, Julian L. - Capt. - 0-297627 (MC)	Medical Officer Gen Duty
Salzman, Ferdinand A. - Capt - 0-440278 (MC)	Radiologist
Scott, Frederick A. - Capt - 0 447800 (MC)	Medical Officer Gen Duty
Sweitzer, Carl E. - Capt - 0-369578 (MC)	Hospital Commander
Biehn, Donald F. - 1st Lt. - 0-524202 (MC)	Medical Officer Gen Duty
Beach, Raynette M. - 2nd Lt. - N-775303 (ANC)	Nurse General Duty
Blechert, Marie E. - 2nd Lt. - N-775067 (ANC)	Nurse General Duty
Breton, Margarita E. - 2nd Lt. - N-783005 (ANC)	Nurse General Duty
Cox, Elaine J. - 2nd Lt. - N-733850 (ANC)	Nurse General Duty
Davis, Mildred C. - 2nd Lt. N-737357 (ANC)	Nurse General Duty
Degrave, Violet - 2nd Lt. N-772407 (ANC)	Nurse General Duty
Dunleavy, Alyce R. - 2nd Lt. - N-775330 (ANC)	Nurse General Duty
Du Pre, Charlotte L. - 2nd Lt. - N-775563 (ANC)	Nurse General Duty
Croninga, Irma E. - 2nd Lt. - N-733935 (ANC)	Nurse General Duty
Jensen, Wanda 2nd Lt - N-737408 (ANC)	Nurse General Duty
Larsen, Helen D. - 2nd Lt. N-775707 (ANC)	Nurse General Duty

STATION HOSPITAL, WHITEHORSE, AS OF 30 APRIL 1944 (Cont'd)

Newton, Phyllis P. - 2nd Lt. N-783595 (ANC)	Nurse General Duty
Person, Verna M. - 2nd Lt. N-737350 (ANC)	Nurse General Duty
Radler, Sylvia G. - 2nd Lt. N-756001 (ANC)	Nurse General Duty
Ronsberg, Jeanette O. - 2nd Lt. N-775533 (ANC)	Nurse General Duty
Smith, Jeanne I. - 2nd Lt. N-775632 (ANC)	Nurse General Duty
Stewart, Dorothy M. - 2nd Lt. N-733920 (ANC)	Nurse General Duty
Thompson, Eleanor I. - 2nd Lt. N-775633 (ANC)	Nurse General Duty
Koerting, Rebecca K. - 2nd Lt. R-000310 (HD)	Hospital Dietitian
Saur, Elizabeth U. - 2nd Lt. M-000599 (PTA)	Physical Therapy Aide

In addition to the officers listed above there were 85 enlisted men assigned to various hospital duties, as well as approximately 25 civilian personnel assigned to duty in the hospital.

STATION HOSPITAL, SKAGWAY, AS OF 16 DECEMBER 1943

Falk, Charles C., Jr. - Major - 0-285867 (MC)	Hospital Commander
Reps, Dewey H. - Major - 0-486440 (MC)	Post Surgeon
Goodwin, Marcus - Captain - 0-499310 (MC)	Medical Officer, Gen Duty
Kendle, Walter E. - Captain - 0-206877 (MC)	Dental Officer
Leadbetter, Wayne A. - Captain - 0-1765757 (VC)	Veterinary Officer
McComb, Charles B. - Captain - 0-272792 (MAC)	Medical Admin. Officer
Silverstein, Abraham - Captain - 0-1690152 (DC)	Dental Officer
McBride, Alden L. - 1st Lt. 0-1534807 (MAC)	Medical Admin. Officer
Rowland, Robert L. - 1st Lt. 0-1546068 (MAC)	Med Supply Officer
Berg, Clarence M. - 2nd Lt. - 0-1547880 (MAC)	Medical Admin. Officer
Cushing, Helen J. - 1st Lt. - N-736268 (ANC)	Nurse General Duty
Adams, Jessie - 2nd Lt. - N-736471 (ANC)	Nurse General Duty
Baxter, Ola V. - 2nd Lt. - N-736531 (ANC)	Nurse General Duty
Beerman, Betty - 2nd Lt. - N-737735 (ANC)	Nurse General Duty
Bender, Greta H. - 2nd Lt. - N-737193 (ANC)	Nurse General Duty
Breton, Margarita E. - 2nd Lt. - N-783005 (ANC)	Nurse General Duty
Culley, Viola - 2nd Lt. - N-737780 (ANC)	Nurse General Duty
Davis, Mildred C. - 2nd Lt. - N-737357 (ANC)	Nurse General Duty
Dooley, Mary A. - 2nd Lt. - N-756938 (ANC)	Nurse General Duty
Green, Margaret H. - 2nd Lt. - N-737730 (ANC)	Nurse General Duty
Jensen, Wanda - 2nd Lt. - N-737409 (ANC)	Nurse General Duty
Mattson, DeLoris V. - 2nd Lt. - N-783635 (ANC)	Nurse General Duty
Person, Verna M. - 2nd Lt. - N-737350 (ANC)	Nurse General Duty
Presber, Alice P. - 2nd Lt. - N-737211 (ANC)	Nurse General Duty
Radler, Sylvia G. - 2nd Lt. - N-756001 (ANC)	Nurse General Duty
Steves, Jocelyn S. - 2nd Lt. - N-783564 (ANC)	Nurse General Duty
Thorntom, Barbara A. - 2nd Lt. - N-783060 (ANC)	Nurse General Duty
Will, Pearl L. - 2nd Lt. - N-737727 (ANC)	Nurse General Duty

In addition to the officers listed above there were 98 enlisted men assigned to various hospital duties.

STATION HOSPITAL, EDMONTON, AS OF 30 APRIL 1944

Joyce, William T. - Major - 0-356641 (MC)	Hospital Commander
Weiner, Leo - Major - 0-423458 (MC)	Chief of Medical Service
Alexander, Leonard C. - Captain -0-484918 (DC)	Dental Surgeon
Carr, Alfred N. - Captain - 0-1701102 (DC)	Dental Surgeon
Dawson, Charles P. - Captain - 0-369475 (DC)	Oral Surgeon Dental
Hoge, Marlin B. - Captain - 0-425800 (MC)	Med Officer Gen Surgery
Moos, Daniel J. - Captain - 0-357626 (MC)	Chief of Surg Service
Nims, Marshall G. - Captain - 0-1701142 (MC)	Med Officer Gen Surgery
Stahl, Philip E. - Captain - 0-384717 (MC)	Neuropsychiatrist
Watson, Douglas J. - Captain - 0-1687230 (MC)	Medical Officer Gen Surgery
Cartnick, Edward N. - 1st Lt. - 0-477143 (MC)	Medical Officer Gen Duty
Melick, William F. - 1st Lt. - 0-530760 (MC)	Urologist
Mescon, Herbert - 1st Lt. - 0-445938 (MC)	Pathologist
Smith, Howard H. - 1st Lt. - 0-1547154 (MAC)	Hq. Company Commander
Tallmadge, John H. - 1st Lt. - 0-1533691 (MAC)	Adjutant
Williams, Burton L. - 1st Lt. - 0-362145 (MC)	Radiologist
Fears, Joseph C. - 2nd Lt. - 0-1547932 (MAC)	Medical Registrar
Coffey, Catherine A. - 1st Lt. - N-733404 (ANC)	Nurse Administrative
Sliger, Thelma C. - 1st Lt. - N-734854 (ANC)	Nurse Administrative
Baker, Betty - 2nd Lt. - N-759573 (ANC)	Nurse General Duty
Carey, Helen M. - 2nd Lt. - N-775692 (ANC)	Nurse General Duty
Classen, Frances V. - 2nd Lt. - N-736415 (ANC)	Nurse General Duty
Covill, Theresa R. - 2nd Lt. - N-756194 (ANC)	Nurse General Duty
Godbey, Frances W. - 2nd Lt. - N-772204 (ANC)	Nurse General Duty
Green, Margaret H. - 2nd Lt. - N-737730 (ANC)	Nurse General Duty
Hoyt, Ruth E. - 2nd Lt. - N-733317 (ANC)	Nurse General Duty
Jones, Winifred E. - 2nd Lt. - N-736454 (ANC)	Nurse Neuropsychiatric
Kent, Lorraine M. - 2nd Lt. - N-731773 (ANC)	Nurse General Duty
Kingsley, Loretta D. - 2nd Lt. - N-775488 (ANC)	Nurse General Duty
Krippner, Martha A. - 2nd Lt. - N-775669 (ANC)	Nurse General Duty
Lemmerman, Klea E. - 2nd Lt. - N-775717 (ANC)	Nurse Operating Room
Nelson, Dorothy A. - 2nd Lt. - N-775661 (ANC)	Nurse General Duty
Salle, Betty J. - 2nd Lt. - N-733765 (ANC)	Nurse Neuropsychiatric
Wilson, Jane A. - 2nd Lt. - N-723260 (ANC)	Nurse General Duty
Culley, Viola M. - 2nd Lt. - N-737780 (ANC)	Physical Therapy Aide
Arnold, Esther - 2nd Lt. - M-000776 (ANC)	Physical Therapy Aide
Koerting, Rebecca K. - 2nd Lt. - R-000310 (HD)	Hospital Dietitian

In addition to the officers listed above there were 72 enlisted men and approximately 42 civilians assigned to various hospital duties.

STATION HOSPITAL, DAWSON CREEK, AS OF 31 MARCH 1944

Gajewski, Matt A.- Major - O-381703 (MC)	District Surgeon Commanding Officer
Evans, Orville T. - Captain - 1685138 (MC)	Medical Officer
Law, Stanley G. - Captain - O-467342 (MC)	Chief, Surg. Off.
Frank, Edmund D. - 1st Lt. O-437532 (MC)	Roentgenologist
Nims, Marshall G. - Captain - O-170114 (MC)	Medical Officer
Schmid, John F. - Captain - O-505844 (MC)	Surgical Officer
White, Ralph E. - Captain - O-463042 (MC)	Surgical Officer
Klieger, Samuel - Captain - O-336565 (MC)	Chief, Med. Off.
Manning, Frank G. - 1st Lt. - O-532501 (SnC)	Dist. Sanitary Off.
Singer, Benjamin R. - Captain - O-357285 (DC)	Dist. Dental Surgeon
Wechsler, Milton E. - Captain - O-1689872 (DC)	Dental Officer
Erickson, Mayo H. - 1st Lt. - O-1765561 (DC)	Dental Officer
Newton, Carlos E. Jr.,- 1st Lt. - O-1534828(MAC)	Adjutant
Fischer, Chas. M. Jr.,- 1st Lt. - O-1546978(MAC)	Dist. Med. Supply Off.
Deming, John F. - 1st Lt. - O-1547917 (MAC)	Registrar
Binzer, Freda E. - 1st Lt. - N-730853 (ANC)	Chief Nurse

In addition to the officers listed above there were approximately 90 enlisted men and 45 civilians assigned to various hospital duties.

The Northwest District, Sixth Service Command had the following Medical Department Roster as of 1 August 1945:

DISTRICT SURGEON'S OFFICE, EDMONTON, ALBERTA

Bowers, Jess W. - Lt. Colonel - O-231465 (MC)	District Surgeon
Bills, William E. - Major - O-23682 (VC)	Dist. Vet. Officer
Maxey, Howard C. - Captain - O-306238 (VC)	Asst. to Dist. Vet. O.
Manning, Frank G. - Captain - O-532501 (SnC)	District Sanitary Off.
Joyce, William T. - Major - O-356641 (MC)	Staff Surgeon
Rowland, Robert L. - Captain - O-1546068 (MAC)	Dist. Admin. Officer

STATION HOSPITAL, EDMONTON, AS OF 1 AUGUST 1945

Moos, Daniel J. - Major - O-357626 (MC)	Hospital Commander
Dawson, Charles P. - Major - O-369475 (DC)	Dist. Dental Surgeon
Batko, Bernard B. - Captain - O-503928 (MC)	E.E.N.T. Specialist
Jackson, Raymond S. - Captain - O-419187 (MC)	Medical Officer
Nevins, Thomas F. Jr. - Captain - O-473300 (MC)	Medical Officer
Stahl, Philip E. - Captain - O-384717 (MC)	Chief, Med. Service
Tallmadge, John H. - Captain - O-1533691 (MAC)	Adjutant
Watson, Douglas J. - Captain - O-1687230 (MC)	Surgical Officer
Erickson, Mayo H. - 1st Lt. - O-1765561 (DC)	Prosthodontist
Spencer, Eugene A. - 1st Lt. - O-1543876 (MAC)	Med. Supply Officer
Coffey, Catherine A. - Captain - N-733404 (ANC)	Nurse Administrative
Gray, Hazel N. - Captain - N-730604 (ANC)	Nurse Administrative
Sliger, Thelma G. - 1st Lt. - N-734854 (ANC)	Nurse Administrative

STATION HOSPITAL, EDMONTON, AS OF 1 AUGUST 1948 (Cont'd)

Alderdice, Margaret N. - 2nd Lt. -N-774538 (ANC)	Nurse General Duty
Gardner, Mary A. - 2nd Lt. - N-801172 (ANC)	Nurse General Duty
Gudenas, Pauline M. - 2nd Lt. - N-795117 (ANC)	Nurse General Duty
Hatcher, Helen R. - 2nd Lt. - N-795357 (ANC)	Nurse General Duty
Johnson, Isabelle P. - 2nd Lt. - N-795357 (ANC)	Nurse General Duty
Knotek, Lydia N. - 2nd Lt. - N-794976 (ANC)	Nurse General Duty
Piasecke, Eleanor S. - 2nd Lt. - N-795125 (ANC)	Nurse General Duty
Quenvold, Marietta J. - 2nd Lt. - N-795414 (ANC)	Nurse General Duty
Rogers, Dorothy B. - 2nd Lt. - N-795782 (ANC)	Nurse General Duty
Tillkemeier, Verna M. - 2nd Lt. N-801096 (ANC)	Nurse General Duty

STATION HOSPITAL, WHITEHORSE, AS OF 1 AUGUST 1945

Durham, Everett W. - Major - 0-421619 (MC)	Hospital Commander
Beebe, Clarence O. - Captain - 0-483772 (DC)	Oral Surgeon Dental
Biehn, Donald F. - Captain - 0-524202 (MC)	Med. Off. Gen. Duty
Eginton, Charles T. - Captain - 0-1700835 (MC)	Chief of Surg. Service
Kelso, Walter C. - Captain - 0-1533600 (MAC)	Adjutant
Salzman, Ferdinand A. - Captain - 0-440278 (MC)	Radiologist
Wykowski, Harriet E. - 1st Lt. - N-774128 (ANC)	Nurse Administrative
Allen, Marion R. - 2nd Lt. - N-726376 (ANC)	Nurse General Duty
Dore, Helen V. - 2nd Lt. - N-801169 (ANC)	Nurse General Duty
Martschinke, Florence - 2nd Lt. N-795453 (ANC)	Nurse Operating Room
Skroch, Prakseda M. - 2nd Lt. - N-795123 (ANC)	Nurse General Duty
Weymiller, Virginia R. - 2nd Lt. - N-795124 (ANC)	Nurse General Duty

NORTHWEST SERVICE COMMAND
INSTALLATIONS REQUIRING MAINTENANCE & OPERATION

SCALE IN MILES 50 0 50 100 150

PREPARED BY ENGINEERING & CONTROL BRANCHES 31 DEC. 1943
N.W. DIVISION U.S. ENGR. DEPT. EDMONTON ALBERTA, CANADA

APPROVED BY _____
BRIGADIER GENERAL, U.S. ARMY - DIVISION ENGINEER

FILE NO. 80/10.08

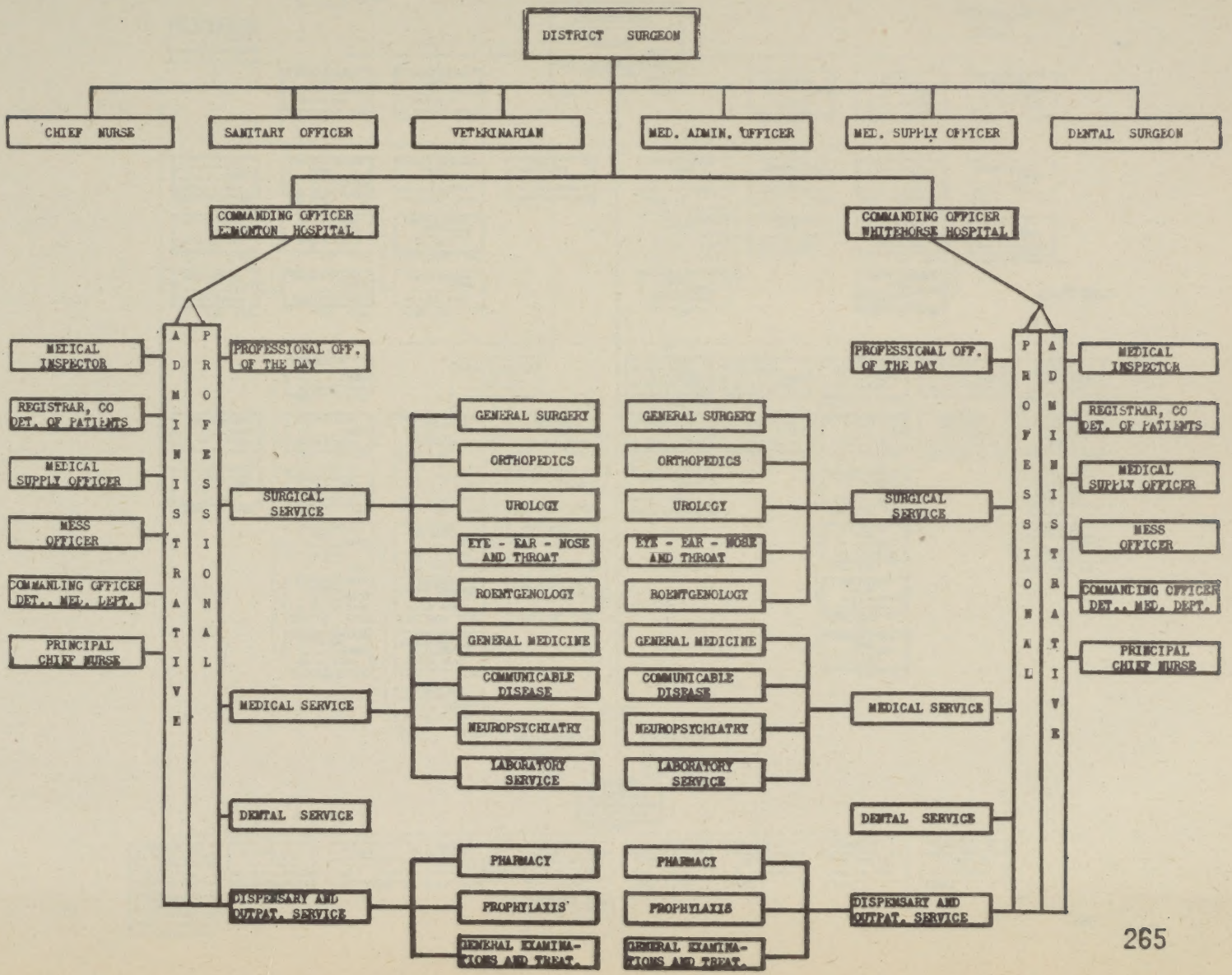
LEGEND

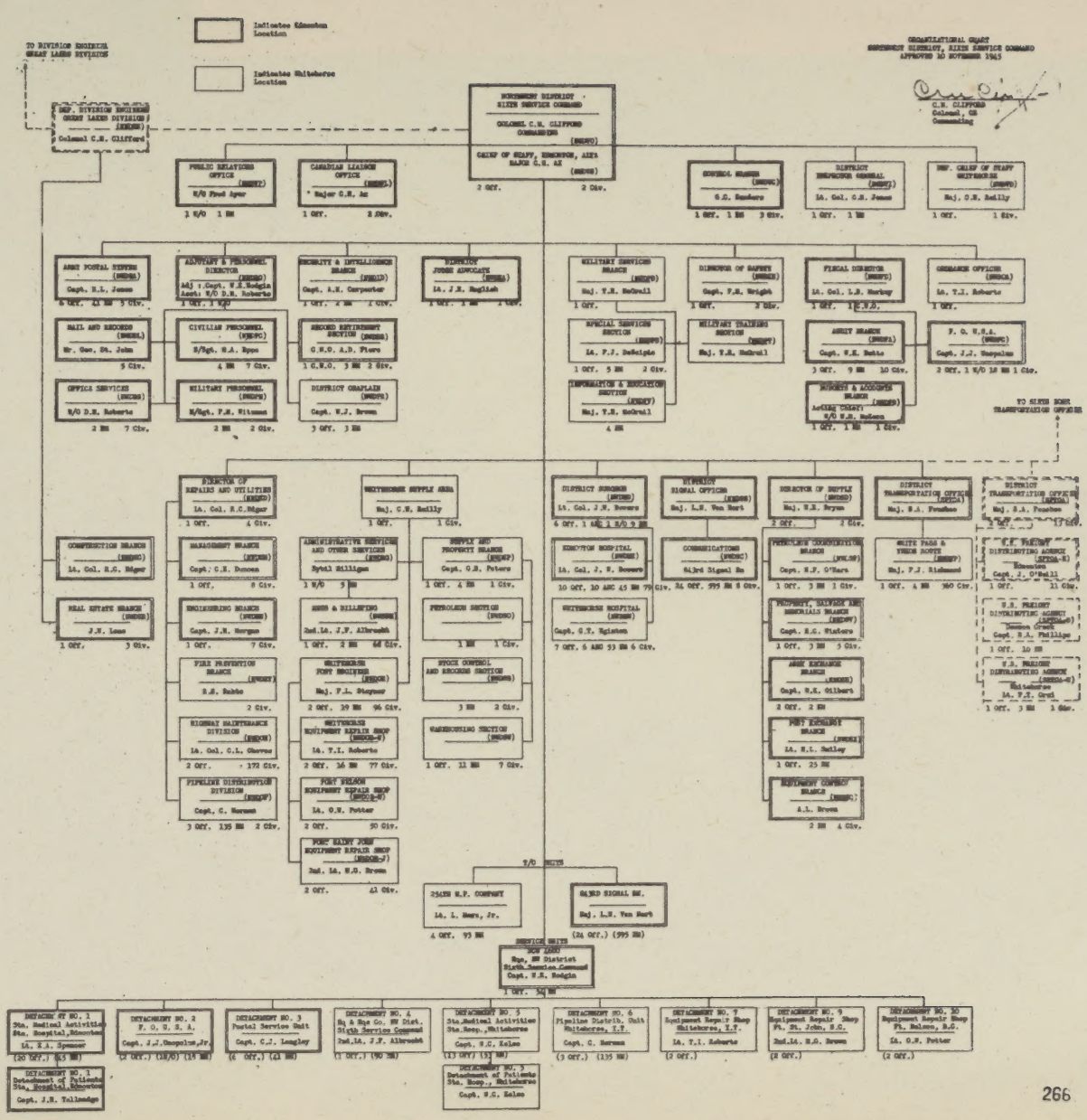
- REPAIR SHOP
- MAINTENANCE CAMP
- PUMPING STATION & GAS STATION
- REFINERY
- GASOLINE STOR.
- RADIO STATION
- PORT
- RAILROADS
- REPEATER STA.
- "C" AIR BASES WITH "D" WORK PROPOSED (FIGURE INDICATES U.S. HOUSING CAPACITY AT AIRBASE.)
- FLIGHT STRIP
- ORDNANCE STOR.
- TROOP HOUSING (MEN)
- WEATHER STA.
- MAJOR POINTS
- TELEPHONE AND TELEGRAPH LINE
- AIR BASES NOT INCL. IN "C" WITH "D" WORK PROPOSED.
- RELAY STATION
- WAY STATION
- HOSPITAL (BEDS)
- LAUNDRY
- DEPOT WAREHOUSE (SQ. FT.)
- WATER ROUTE
- WINTER ROADS
- ALASKA HIGHWAY
- NORMAN WELLS RD.
- HAINES MILITARY HIGHWAY
- INDICATES HIGHWAY MILEAGE
- CANAL NO. 1
- CANAL NO. 2
- CANAL NO. 3
- CANAL NO. 4

48 11958

MEDICAL DEPARTMENT

NORTHWEST DISTRICT, SIXTH SERVICE COMMAND




Indicates Edmonton Location
Indicates Whitehorse Location
TO DIVISION ENGINEER GREAT LAKES DIVISION
ORGANIZATIONAL CHART NORTHWEST DISTRICT, ALCAN SERVICE COMMAND APPROVED 20 NOVEMBER 1943
C.M. CLIFFORD Colonel, GS Commanding
DEP. DIVISION ENGINEER GREAT LAKES DIVISION (ENGR) Colonel C.M. Clifford
NORTHWEST DISTRICT ALCAN SERVICE COMMAND COLONEL C.M. CLIFFORD COMMANDING (NWDTO) CHIEF OF STAFF, EDMONTON, ALTA MAJOR C.H. AX (NWDGS)
2 Off. 2 Civ.
PUBLIC RELATIONS OFFICE (NWDPI) M/G Fred Ayer
1 M/G 1 BN
CANADIAN LIAISON OFFICE (NWDCL) * Major C.H. Ax
1 Off. 2 Civ.
GENERAL MESS (NWDMS) G.S. Sanders
1 Off. 1 BN 3 Civ.
DISTRICT INSPECTOR GENERAL (NWDIG) Lt. Col. G.H. Jones
1 Off. 1 BN
DEP. CHIEF OF STAFF WHITEHORSE (NWDWH) Maj. G.H. Reilly
1 Off. 1 Civ.
ARMY POSTAL SERVICE (NWDPA) Capt. H.L. Jones
5 Off. 41 BN 3 Civ.
ADJUTANT & PERSONNEL DIRECTOR (NWDAD) Adj : Capt. W.E.Hodgin Asst: W/O D.H. Roberts
1 Off. 1 W/O
SECURITY & INTELLIGENCE BRANCH (NWDSI) Capt. A.H. Carpenter
1 Off. 2 BN 1 Civ.
DIVISION JUDGE ADVOCATE (NWDJA) Lt. J.E. English
1 Off. 1 BN 2 Civ.
MILITARY SERVICES BRANCH (NWDMS) Maj. T.H. McGrail
1 Off.
DIRECTOR OF SAFETY (NWDSF) Capt. F.H. Wright
1 Off. 3 Civ.
FISCAL DIRECTOR (NWDFI) Lt. Col. L.B. Hurley
1 Off. 1 C.S.D.
ORDNANCE OFFICER (NWDOA) Lt. T.I. Roberts
1 Off.
MAIL AND RECORDS (NWDRL) Mr. Geo. St. John
5 Civ.
CIVILIAN PERSONNEL (NWDPC) S/Sgt. H.A. Epps
4 BN 7 Civ.
RECORD REFERENCE SECTION (NWDRR) C.W.O. A.D. Pierce
1 C.W.O. 3 BN 2 Civ.
SPECIAL SERVICES SECTION (NWDPS) Lt. F.J. DeRuiple
1 Off. 5 BN 2 Civ.
MILITARY STAFFING SECTION (NWDMT) Maj. T.H. McGrail
ARMY BRANCH (NWDPA) Capt. H.E. Betts
3 Off. 9 BN 10 Civ.
P. O. N.S.A. (NWDPC) Capt. J.J. Gaspalou
2 Off. 1 W/O 10 BN 1 Civ.
OFFICE SERVICES (NWDRS) W/O D.H. Roberts
2 BN 7 Civ.
MILITARY PERSONNEL (NWDPM) M/Sgt. F.M. Witmer
2 BN 2 Civ.
DISTRICT CHAPLAIN (NWDPR) Capt. W.J. Brown
3 Off. 3 BN
INFORMATION & EDUCATION SECTION (NWDEY) Maj. T.H. McGrail
4 BN
FINANCE & ACCOUNTS BRANCH (NWDFB) Acting Capt. W/O H.B. Nelson
1 Off. 1 BN 1 Civ.
TO ALCAN HIGH TRANSPORTATION OFFICER
DIRECTOR OF REPAIRS AND UTILITIES (NWDRU) Lt. Col. R.C. Edgar
1 Off. 4 Civ.
WHITEHORSE SUPPLY AREA Maj. C.H. Reilly
1 Off. 1 Civ.
DISTRICT SURGEON (NWDMD) Lt. Col. J.N. Bowers
6 Off. 1 AC 1 W/O 9 BN
DISTRICT SIGNAL OFFICER (NWDSG) Maj. L.H. Van Hart
DIRECTOR OF SUPPLY (NWDSU) Maj. W.B. Bryan
2 Off. 2 Civ.
DISTRICT TRANSPORTATION OFFICER (NWDTA) Maj. S.A. Peaches
2 Off. 17 Civ.
DISTRICT TRANSPORTATION OFFICER (NWDTA) Maj. S.A. Peaches
U.S. FREIGHT DISTRIBUTING AGENCY (NWDDA-E) Edmonton
Capt. J. O'Neill
1 Off. 11 Civ.
U.S. FREIGHT DISTRIBUTING AGENCY (NWDDA-S) Dawson Creek
Capt. E.A. Phillips
1 Off. 10 BN
U.S. FREIGHT DISTRIBUTING AGENCY (NWDDA-W) Whitehorse
Lt. F.T. Crut
1 Off. 3 BN 1 Civ.
CONSTRUCTION BRANCH (NWDNC) Lt. Col. R.C. Edgar
REAL ESTATE BRANCH (NWDRE) J.H. Lane
1 Off. 3 Civ.
MANAGEMENT BRANCH (NWDMN) Capt. C.H. Duncan
1 Off. 8 Civ.
ENGINEERING BRANCH (NWDNE) Capt. J.H. Morgan
1 Off. 7 Civ.
FIRE PREVENTION BRANCH (NWDFF) R.S. Rabbe
2 Civ.
HIGHWAY MAINTENANCE DIVISION (NWDHM) Lt. Col. C.L. Chevre
2 Off. 372 Civ.
PIPELINE DISTRIBUTION DIVISION (NWDPW) Capt. C. Herman
3 Off. 135 BN 2 Civ.
ADMINISTRATIVE SERVICES AND OTHER SERVICES (NWDAS) Sgtmaj Gilligan
1 W/O 5 BN
MESS & BILLETING (NWDMB) 2nd.Lt. J.F. Allbrandt
1 Off. 2 BN 64 Civ.
WHITEHORSE PORT ENGINEER (NWDPE) Maj. F.L. Stegner
2 Off. 39 BN 96 Civ.
WHITEHORSE EQUIPMENT REPAIR SHOP (NWDEQ-W) Lt. T.I. Roberts
2 Off. 16 BN 77 Civ.
FORT NELSON EQUIPMENT REPAIR SHOP (NWDEQ-N) Lt. O.N. Potter
2 Off. 90 Civ.
FORT SMITH JOHN EQUIPMENT REPAIR SHOP (NWDEQ-F) 2nd. Lt. H.O. Brown
2 Off. 41 Civ.
SUPPLY AND PROPERTY BRANCH (NWDSP) Capt. O.B. Peters
1 Off. 4 BN 1 Civ.
PETROLEUM SECTION (NWDSO)
1 BN 1 Civ.
STOCK CONTROL AND RECORDS SECTION (NWDSR)
3 BN 2 Civ.
WAREHOUSING SECTION (NWDSW)
1 Off. 12 BN 7 Civ.
EDMONTON HOSPITAL (NWDME) Lt. Col. J. W. Bowers
10 Off. 10 ANC 45 BN 79 Civ.
WHITEHORSE HOSPITAL (NWDMW) Capt. O.T. Nielsen
7 Off. 6 ANC 53 BN 6 Civ.
COMMUNICATIONS (NWDSC) 64rd Signal Bn
24 Off. 295 BN 8 Civ.
PETROLEUM COORDINATION BRANCH (NWDSW) Capt. H.F. O'Hara
1 Off. 3 BN 1 Civ.
PROPERTY, SALVAGE AND REMOVALS BRANCH (NWDSW) Capt. E.C. Waters
1 Off. 3 BN 5 Civ.
ARMY EXCHANGE BRANCH (NWDEX) Capt. H.E. Gilbert
2 Off. 2 BN
PORT EXPEDITER BRANCH (NWDEX) Lt. H.I. Bailey
1 Off. 25 BN
EQUIPMENT CONTROL BRANCH (NWDEC) A.L. Brown
2 BN 4 Civ.
GATE PASS & TRUCK ROUTE (NWDTP) Maj. F.J. Richmond
1 Off. 4 BN 360 Civ.
9/0 BN
2543RD M.P. COMPANY Lt. L. Hare, Jr.
4 Off. 93 BN
64RD SIGNAL BN. Maj. L.H. Van Hart
(24 Off.) (295 BN)
SERVICE UNITS
NCW 1000 Maj. NW District Sixth Service Command Capt. W.E. Hodgin
1 Off. 34 BN
DETACHMENT NO. 1 Sta. Medical Activities Sta. Hospital, Edmonton Lt. K.A. Spencer
(20 Off.) (45 BN)
DETACHMENT NO. 1 Detachment of Patients Sta. Hospital, Edmonton Capt. J.R. Tallmadge
DETACHMENT NO. 2 F. O. U. S. A. Capt. J.J. Gaspalou, Jr.
(2 Off.) (10/0) (15 BN)
DETACHMENT NO. 3 Postal Service Unit Capt. C.J. Langley
(1 Off.) (21 BN)
DETACHMENT NO. 4 Sq & Hqs Co. NW Dist. Sixth Service Command 2nd.Lt. J.F. Albrandt
(1 Off.) (90 BN)
DETACHMENT NO. 5 Sta.Medical Activities Sta.Hosp., Whitehorse Capt. H.C. Kelso
(13 Off.) (3) BN
DETACHMENT NO. 5 Detachment of Patients Sta. Hosp., Whitehorse Capt. H.C. Kelso
DETACHMENT NO. 6 Pipeline District, Unit Whitehorse, Y.T. Capt. C. Herman
(3 Off.) (135 BN)
DETACHMENT NO. 7 Equipment Repair Shop Whitehorse, Y.T. Lt. T.I. Roberts
(2 Off.)
DETACHMENT NO. 9 Equipment Repair Shop Ft. St. John, B.C. 2nd.Lt. H.O. Brown
(2 Off.)
DETACHMENT NO. 10 Equipment Repair Shop Ft. Nelson, B.C. Lt. O.N. Potter
(2 Off.)